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ABSTRACT

The Skills Map, a comprehensive classification of occupations based on their competency requirements, was developed to assess the employability of individuals and of various groups of individuals in different types of occupations. The data on which it was based were the ratings of required worker traits as given by the Dictionary of Occupational Titles (DOT). The practical and theoretical usefulness of the classification was examined according to seven criteria: valid job descriptors, comprehensive occupational coverage, comprehensive aptitude coverage, a comprehensible map of job differences, parallel assessment of people and jobs, a link to demographic data, and multiple levels of analysis. Data for job descriptor validity were positive but inadequate. The DOT ratings provided quite comprehensive coverage of jobs and reasonable coverage of academic and motor, but not interpersonal, aptitudes. Map structure was readily comprehensible. A way to assess jobs and people in parallel ways was not provided. The Skills Map was readily linked to demographic data available according to the Census Bureau's 1970 classification of occupations. It provided a global classification of occupations according to their general differences and additional detail about the aptitudes and activities that individual occupations require. (Appendixes amounting to approximately one-half of the report provide materials and data used in the analyses.) (YLB)

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The Validity of an Occupational Classification Based on Job Competencies For Assessing Employability

Linda S. Gottfredson
Center for Social Organization of Schools
Johns Hopkins University

January 1983

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Abstract

This report reviews the development of the Skills Map, a comprehensive classification of occupations based on their competency requirements. The purpose for which the classification was developed was to be able to assess the employability of individuals and of various groups of individuals in different types of occupations. The data on which it is based are the Dictionary of Occupational Titles (DOT) ratings of worker traits required. The bulk of the report is then devoted to examining the practical and theoretical usefulness of the classification according to seven criteria: job descriptors are valid, coverage of occupations is comprehensive, coverage of aptitudes is comprehensive, the classification provides a comprehensible and meaningful map of job differences, people and jobs are assessed in parallel ways, demographic data can be directly linked to the classification, and multiple levels of analysis are included.

Data for evaluating the Skills Map against the seven criteria were obtained from four major sources. Publications of the U.S. Employment Service provided data on aptitude patterns among individuals as assessed with the General Aptitude Test Battery (GATB), aptitude patterns among specific occupations as profiled in over 400 Specific Aptitude Test Batteries (SATBs), and aptitude patterns among several dozen major groups of jobs (i.e., the USES's own 66-category GOE occupational classification) as summarized by occupational Aptitude Patterns (OAPs). Data from the archives of the Position Analysis Questionnaire (PAQ) provided additional job descriptors for several thousand job titles. Data on competency requirements among primarily high-level jobs were collected in a survey of several

hundred adult males. Data on 1970 employment by detailed occupational category were obtained from Census Bureau publications.

Conclusions are that the Skills Map is potentially very useful for both practical and theoretical applications, but that modifications are needed. Specifically, (a) Data for the validity of the job descriptors is positive but more is needed. (b) The DOT ratings upon which the Skills Map is based provide quite comprehensive coverage of jobs in the U.S. economy. (c) The DOT provides reasonable coverage of academic (i.e., cognitive) and motor aptitudes but not of interpersonal ones. The PAQ contributes items on interpersonal activities, but they apply primarily to high-level jobs. Although the three dimensions of the Skills Map tap the major distinctions among the full range of jobs, the distinctions made by the "dealing with people" dimension should be modified. (d) The structure of the map is a readily comprehensible one. However, the apparent heterogeneity of some of the groups, much of it the result of variation along other dimensions of work (some competency-related and others not), may somewhat reduce the meaningfulness and acceptability of the classification to potential users. (e) The Skills Map does not provide a way to assess jobs and people in parallel ways. Partial links to GATB scales and curricular content are provided. (f) The Skills Map is readily linked to demographic data available according to the Census Bureau's 1970 classification of occupations. (g) The Skills Map provides a global classification of occupations according to their general differences. It also provides additional detail about the aptitudes and activities individual occupations require. A level of analysis intermediate to these two, which would provide "sub-maps" of competencies of secondary importance in several major sectors of work, would be desirable. Lower (i.e., more detailed) levels of description can be obtained by organizing studies of specific occupations or training programs according to the Skills Map structure.

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The task of vocational counselors, employment counselors, and personnel officers is to help individuals find jobs suitable for their particular interests and abilities or to find employees suitable for jobs being filled. This task has stimulated considerable research for many decades on how to best match people and jobs and it has resulted in the development of innumerable devices for assessing vocational interests and aptitudes. It has also led to the development of a wide variety of job classifications based on similarities in the interests, abilities, or tasks required by different jobs. These efforts to match particular people with particular jobs are designed to promote both the job satisfaction and the satisfactoriness (Lofquist & Dawis, 1969) of the worker (i.e., his or her performance) in the job.

When significant numbers of people are deficient in the most basic attributes required by jobs and therefore their employment prospects are poor, people often speak of the problem of "employability." Employers' complaints that a high proportion of job applicants lack fundamental academic and social skills are often interpreted in terms of the employability of young entrants to the labor force. Discussions of employability generally encompass a concern with the fate of particular groups in society (e.g., high school dropouts, teenagers, or minority youth) rather than with the more general issue of the mismatch between the labor supply and labor demand in an economy.

As noted in an earlier report (Gottfredson, 1981) employability---what makes a person employable--depends upon the occupation being considered because different occupations often require different skills. To better understand the combinations and levels of skills required by jobs in our economy, and thus to better assess how competitive different types of individuals or social groups might be in their search for jobs, we have developed a classification of all jobs in the United States according to the competencies they require. The present report briefly summarizes that work (Gottfredson, 1981). It then evaluates the limitations and potentials of our Skills Map job classification according to seven criteria that any classification should meet if its purpose is to help assess employability.

Development of the Skills Map

The objectives of the earlier research were (a) to identify the major dimensions of competency required by jobs, (b) to group occupations into a smaller number of categories according to the major types of aptitudes required (i.e., to create a competency-based job classification), and (c) to describe these groups and the individual occupations within them according to their specific job skills and working conditions.

Three major sets of data were used in that study: The Dictionary of Occupational Titles (DOT), the Position Analysis Questionnaire (PAQ), and 1970 census data on employment. Each of these sources was chosen because it provides data for a large and widely representative set of jobs in the U.S. economy. Only a brief description of these data is provided below. Details can be obtained in the previous report.

The DOT was developed by the U.S. Employment Service. The USES was established during the Depression to help classify workers and place them in appropriate jobs. Since then the Employment Service has carried out extensive work in cataloging and describing jobs. Perhaps the most well known aspect of this work is the periodically-revised dictionary or compendium of job titles and job descriptions, The Dictionary of Occupational Titles (DOT, e.g., U.S. Department of Labor, 1965, 1977). Another aspect of that research has been the production of ratings of jobs according to their activities, requirements, and working conditions. Specifically, as of the latest edition in 1977, there are ratings of 46 job attributes: worker functions (3), training times (4), aptitudes (11), temperaments (10), interests (5), physical demands (6), and environmental conditions (7).

The PAQ was developed by a team of industrial psychologists during the last two decades to describe what workers do in different jobs (e.g., McCormick, Jeanneret, & Mecham, 1972; Mecham, McCormick, & Jeanneret, 1977a, 1977b). This questionnaire provides a structured means for rating a wide spectrum of jobs according to 194 "job elements:" types of information input (35), mental processes used (14), work output (49), relationships with other persons (36), job context (10), and other job characteristics such as work schedule and method of receiving pay (41). Objectives of the PAQ are to enable firms to create more effective and equitable compensation, performance appraisal, training, and career guidance systems.

The decennial census collects various types of information about workers which are subsequently published in tabular form (e.g., U.S. Bureau of the Census, 1973) according to the Census Bureau's detailed job classification: for example, number of employed men and women, percentage who are employed by the government, percentage who are

Negro, mean hours worked, median age of workers, median years of school completed, and median income.

DOT data were available for over 12,000 job titles and PAQ data for over 1,800 titles. These data were aggregated according to the 441-category 1970 census classification so that occupational categories could be characterized by both the DOT and PAQ competencies they require as well as the socioeconomic and demographic attributes of the workers they employ.

Factor analysis was used to determine what the major dimensions are among the various aptitude measures. Only the job attribute scales that seemed to reflect competencies (e.g., aptitudes, some temperaments, interests, specific behaivors required) were used in the factor analyses because the objective was to determine the major dimensions of job competencies required, not of all job characteristics. Education and training, working conditions, and method of receiving income were omitted from the factor analyses.

The major conclusions of the factor analyses were as follows:

(1) The four major dimensions of general job aptitudes as measured by the DOT are academic aptitudes (e.g., facility with language and mathematics), dealing with people (presumably reflecting interpersonal competencies), psychomotor aptitudes (e.g., manual dexterity and eye-hand coordination), and strength. The first three, and most important, factors are similar to the much-used data-people-things trichotomy of worker functions in the DOT. Those three DOT variables do, in fact, correlate highly with the three respective factors. These were also the three major dimensions predicted

from studies of human abilities.

(2) By far the most important dimension distinguishing among jobs is that of academic aptitudes.

(3) The factors are essentially the same whether they are forced to be statistically independent (orthogonal) or allowed to be correlated (oblique). This was also predicted from knowledge of human ability patterns.

(4) When oblique rotation is used, it is clear that dealing with people is slightly positively correlated with requirements for higher academic aptitudes ($r = .24$) but it is negatively correlated with psychomotor aptitudes ($r = -.35$).

(5) When the PAQ data are factor analyzed together with the DOT data, they are largely incorporated into the original DOT factor structure indicating that the two types of data provide a consistent portrayal of job demands.

(6) Several new, but less important, factors appear which are composed primarily of PAQ variables.

(7) The addition of the PAQ variables helps to interpret the DOT factors and add new meaning to them.

Three of the four dimensions revealed by the factor analyses--academic competencies, psychomotor competencies, and dealing with people--were used to create a competency-based job classification. Strength was omitted because it was less important than the others and because its inclusion would have created a needlessly complex classification. The job classification was designed to show which occupations require low versus moderate versus high levels of each of the three major types of general abilities. Academic aptitude was divided into four rather than three levels because it is so important in distinguishing among jobs. The psychomotor and people dimensions were divided into three levels. The cutting points were chosen with two criteria in mind: that there be a reasonable number of occupations at each level of that dimension and that the range of scores represent meaningful differences. All occupations were then grouped into 36 categories according to their level on each of the dimensions (4 academic levels by 3 psychomotor levels by 3 people levels = 36 groups). These groups are shown in Figure 1.

Insert Figure 1 About Here

Among "low academic" jobs, there are no jobs requiring high motor skills that also require workers to deal with people (reducing the number of groups to 34). There are jobs, however, with all other combinations of skills. There are jobs requiring high motor skills but low academic skills (e.g., jewelers) and vice versa (e.g., mathematicians). There are some jobs requiring high levels of one of the types of aptitudes but only low levels of the other two types of skills (e.g., authors are high on academic ability, personal service attendants are high on dealing with people, and jewelers are high on psychomotor aptitudes). Although there are jobs for almost all combinations of general aptitudes, not all combinations of skills are equally numerous when the number of jobs in each category is considered. Table 1 shows that almost one out of five workers in 1970 was employed in Group 4, which consists of jobs that require moderate psychomotor aptitude but little or no academic aptitude or dealing with people (e.g., assembler, welder). About 4% were in jobs requiring moderate levels of all three general competencies (Group 14; e.g., file clerk, plumber) and less than 1% were in jobs requiring the highest levels of all three (Group 36; e.g., physician, dentist).

Insert Table 1 About Here

The classification is a guide for focusing attention on the major requirements of jobs and for stimulating an evaluation of an individual's current and desired skills. It may also help to narrow a person's attention to one or several groups of jobs that seem suitable and interesting. But there are still differences among and within these occupational groups that are important considerations in career choice and preparation. Therefore, it is useful to supplement the classification with information about the specific activities occupations require and the working conditions they provide.

This more detailed information is provided in the earlier report in seven appendices; they include data on the following groups of job attributes: academic abilities and mental activities (Appendix C), psychomotor abilities and motor tasks (D), dealing with people and interpersonal activities (E), other abilities, bipolar interests, and sources of information (F), responsibility, vigilance, and education and training (G), working conditions (H), and prestige level and Holland field of work (I).

Three types of information were provided in these appendices.

(1) Correlations of each of the DOT and PAQ variables with the three major competency dimensions are shown. These correlations indicate how

closely related each of the individual competencies is to the three general dimensions. For example, decision making, reasoning, planning, writing, and compiling, combining, and analyzing information are highly correlated (.7) with the academic dimension and moderately (.5) with dealing with people. The correlations also show to what extent non -ability attributes of jobs are related to the competency dimensions. For example, lack of job structure is most strongly related to the academic dimension: the greater the demands for academic aptitude are, the greater the variety and change, the less repetitious the work or continuous the workpace, and the less structured or supervised the activities.

(2) Average scores on each job attribute were calculated for each of the 36 occupational groups and then translated into percentile scores. These percentiles indicate to what extent the jobs require the competencies in question relative to other occupations. For example, Group 1 occupations (those requiring only low levels of academic aptitude, psychomotor aptitude, or dealing with people) are at the second percentile on verbal ability. In other words, they require less verbal ability than almost all other occupations.

(3) Each individual occupation is marked as being either low, moderate, or high on each of the job attributes. These designations are useful because they provide some indication of the variability of requirements within the same occupational group, variability that is masked by the percentile (which is based on an average score). In addition, these designations indicate roughly how important these attributes are in absolute rather than relative terms. For example, very few occupations require workers to entertain people, so a high percentile does not necessarily mean

that there is much demand by the job for this activity.

Appendix A of this report lists the DOT and PAQ variables used in the earlier report. Appendix B reviews the correlations of those variables with the three dimensions of the Skills Map; it also briefly describes the 36 Skills Map groups. Both appendices are taken in large part from the earlier report and are included here for interpreting analyses to be presented in later sections of the present report.

Evaluation of the Skills Map

Seven criteria are used below to evaluate the Skills Map just described. Some of the criteria, such as reliable and valid job ratings, apply to any job classification. Others are specific to the purposes of the Skills Map, which is to understand the employability of different types of individuals.

Many classifications or typologies have been developed to portray differences among jobs in their tasks and requirements. Some meet more of the seven criteria than do others. Because of the DOT's widespread dissemination and use, as well as its attractive features, the following pages will devote considerable attention to the occupational classification accompanying the DOT.

In order to evaluate the Skills Map according to the different criteria, relevant additional data were collected from a variety of sources. These date will be described as they are introduced.

Criterion 1: Valid job descriptors. The classification should be based on reliable and valid data on the abilities required by jobs.

Type of job data. For the purpose of assessing employability, job requirements should be determined by analyzing the *job* itself rather than the characteristics of its incumbents. For example, the educational level or cognitive skills of current workers in a job may not accurately reflect the levels necessary for satisfactory performance on the job (they may be higher or lower), but may be in large part a function of past supply and demand in the labor market or of restrictions in access to jobs or training. Both the DOT and PAQ data are based on analyses of jobs themselves.

Both the DOT and PAQ data consist of job _ratings_ made by job analysts or job incumbents themselves. DOT analysts rate aptitudes according to the level required for "average, satisfactory performance" (U.S. Department of Labor, 1972, p. 233). They rate temperaments as present if they are "important in relation to the kinds of adjustments which the worker must make for successful job performance" (p. 313). Interests are likewise rated for their importance for job performance. Thus the implied criterion for the ratings is the _level_ (in some cases just the presence) of the skill required for _satisfactory job performance_.

PAQ ratings are of several types as noted in Appendix A; extent of use, importance, and several special scales that were used for the particular job elements listed in the appendix. Most of those elements are rated according to their importance to the job, which the PAQ _Manual_ (Mecham et al., 1977b, p. 5) suggests might "include consideration of such factors as the influence of the item upon overall job performance of the worker, the time spent, and the criticality of the activity to the job." Although a relation with job performance is thus an important consideration in the PAQ ratings, _extent of use_ is another. The special codes (e.g., the scale for decision making) generally refer to another implied criterion--the _difficulty level_ typically required (regardless of the criticality or extent of use of the skill).

An alternative type of job data is exemplified by the Specific Aptitude Test Batteries (SATBs) developed by the U.S. Employment Service (U.S. Department of Labor, 1980b). SATBs are the cutting scores required for satisfactory job performance on the two to four (of the nine) General Aptitude Test Battery (GATB) aptitudes most predictive of job performance. The point here is that job descriptors can be based on data relating worker aptitudes to actual worker performance on the job. While this procedure would seem likely to produce more valid job descriptors than would expert ratings such as those in the DOT and PAQ, there are problems with the procedure. Data such as the SATBs are more costly and difficult to obtain. Over several decades the USES has published fewer than 500 SATB´s. The USES has concluded that there is considerable unreliability in the profiles, because SATB´s for the same job often differ. As a result of these limitations, the USES´s own occupational classification is based on a combination of DOT ratings and SATBs. (The USES classification will be discussed further below.)

Reliability and validity of data. The Skills Map was created primarily from DOT data. In addition, more information is available for examining the properties of DOT data than of the PAQ data. Therefore, the following discussion will focus on the former and make only brief mention of the PAQ data.

Mecham et al. (1977a, Table 1) report PAQ reliabilities. When job elements were rated by different analysts, the average reliability coefficient was .68, with over two-thirds of the coefficients being between .6 and .8. When rated by the same analyst, reliabilities averaged .78, with almost 80%

of the reliabilities falling between .7 and .9. Unfortunately, no information is provided in the PAQ manual about the reliability of individual items or of specific types of items.

Less information is available about the reliability of the DOT scales, and that which is available is mixed. Miller, Treiman, Cain, and Roos (1980) report reliabilities for 9 of the 46 DOT scales. Minimum estimates of reliabilities were .84 (Data), .80 (People), .25 (Things), .75 (GED-Reason), .58 (GED-Math), .67 (GED-Language), .76 (SVP), .34 (Strength), and .64 (Location). With the exception of Things, Strength, and GED-Math, the reliabilities are reasonable. However, these represent but a fraction of all the DOT traits and none of those most central to the Skills Map. When the four DOT and PAQ variables of seemingly identical content are compared, their correlations are consistent with the foregoing reliabilities--.60 (SVP with Training), .76 (MathDOT with MathPAQ), .77 (Strength with Exertion), and .82 (GED with Education). While the reliability evidence is generally positive, clearly more is needed.

Our procedure of aggregating both DOT and PAQ data according to 1970 census categories probably increased the reliability of the ratings if it is assumed that all job titles within a census category are reasonably homogeneous in their demands. (The number of cases aggregated in each census category is provided in Appendix C.)

Some indications of the probable quality of the DOT and PAQ data can be obtained by examining the procedures by which occupations are rated. PAQ questionnaires are completed either by someone familiar with the job (e.g., a job analyst, worker, or supervisor) or by interviewing someone who is familiar with the job. Job analysts are generally positive about the PAQ

(Mecham et al., 1977a, Table 2). They report that the instructions on how to use the questionnaire are easy to follow (94%), the format of the PAQ is easy to follow (88%), and the PAQ items are easy to understand (71%). They are less positive about their ability to describe a job accurately (62%) or thoroughly (44%) using the PAQ.

DOT ratings are made by trained job analysts. However, several types of problems have been reported with DOT rating procedures (see Miller et al., 1980). Raters do not always have access to all the information they need about a job in order to follow their job analysis guidelines. Sixteen percent of DOT occupational descriptions (most ratings are made from such descriptions) are unsupported by job analysis schedules and an additional 29% are supported by only one schedule. In addition, only two-thirds of these schedules are acceptable by the procedures outlined in the _Handbook for Analyzing Jobs_ (U.S. Department of Labor, 1972). DOT analysts also report problems making ratings, particularly of SVP and the aptitudes. The various worker traits are not clearly defined nor, apparently, do the rating instructions or illustrations provided in the _Handbook_ provide sufficient guidance for how to assign ratings. Miller et al. also report that because of time constraints, procedures were relaxed during the latter phases of compiling ratings for the fourth edition DOT.

The three foregoing problems probably exacerbate a problem that plagues all ratings of jobs--illusory halo. Illusory halo refers to correlations that are spuriously high. There is indeed reason to worry about halo in the DOT ratings, because correlations among many of the DOT scales are quite high (cf., Miller et al. who report that correlations are particularly high when the same rater is responsible for all ratings). This problem will be examined further below because it constitutes a potential source of systematic bias, making it a more insidious problem than unreliability which only introduces "noise" into the results.

Cooper (1981) reviewed the problem of illusory vs. true halo and distinguished among various sources of illusory halo. Those sources which seem particularly relevant to DOT data in light of the previous discussion include: (a) having insufficient opportunity to observe the job being rated, (b) using rating categories that are abstract and a priori vs. highly descriptive, empirically derived, specific, and concrete, and (c) expending insufficient effort in making ratings. In the absence of sufficient information, raters tend to impose their own theories of "what goes with what" when they make ratings.

Several analyses are provided below to further assess the quality of the DOT data and to better specify the meaning of the different DOT scales. Because of the lack of specificity about what many of the DOT variables are supposed to mean or to measure, establishing their validity means finding out what they do seem to measure in practice. The following analyses examine the distributions of the different DOT variables and the relations of the aptitudes to one another in different types of samples. These analyses suggest what effects aggregating DOT data according to census categories may have, which variables may be more useful than others, and where illusory halo may be a problem.

Distributions for the DOT aptitude ratings. Selected characteristics of the distributions of most of the DOT ratings are provided in Table 2. (Because they were not relevant to the Skills Map, the working conditions and all but one physical demand are excluded here.) Results are provided separately for two sets of data: a 10% random sample of all 12,099 DOT titles (Miller et al., 1980, p. 174) and all 12,064 DOT civilian job titles aggregated for the Skills Map study according to 396 1970 census categories. Differences in results for the two samples are not large. The aggregated data reflect higher mean skill levels among jobs because, as will be discussed further later, manufacturing jobs, which are lower level on the average than are the non-manufacturing jobs, are more highly aggregated by the census categories. The three variables that depart most from normality in both samples are the worker function people and the aptitudes of eye-hand-foot coordination and color discrimination. These three show most jobs bunched together at the low skill levels with titles skewing off toward the higher skill levels. The people variable is frequently used in research, but the other two are not.

Insert Table 2 About Here

Verbal, data vs. things, and machines vs. social welfare are also highly skewed in the 10% random sample, but are less so when aggregated. Data, things, and SVP are fairly flat distributions in both samples; finger dexterity is flat in the aggregated sample only; science vs. business and productive vs. prestige are flat in the random sample. Overall, then, aggregation appears to have reduced the number of distributions that differ markedly from normality.

Correlations among DOT ratings and GATB scores for aptitudes. There are several sources of data for examining the properties of the aptitude scales, the scales that are most relevant here. The DOT aptitude scales used for rating job requirements parallel the scales of the USES General Aptitude Test Battery (GATB; U.S. Department of Labor, 1970). The latter is a set of tests administered to individuals for assessing whether or not they possess minimum levels of the particular aptitudes most highly related to satisfactory job performance in different jobs.

The three panels of Table 3 present three types of correlations among the nine aptitude scales: (a) among aptitude scores of people taking the GATB, (b) among aptitudes for 446 occupations based on the average GATB scores (and also the minimum scores) of people in those occupations, and (c) among job analysts´ DOT ratings of the level of each aptitude required in different jobs. Although all three types of correlations involve the same nine aptitudes, they represent different types of information about aptitudes. The correlations among GATB scores at the individual level (the upper panel) reflect the structure of human abilities (at least those tested with the GATB); that is, they reveal to what extent people who are high in one aptitude are also high in another. The correlations among job ratings (the bottom panel) reflect the structure of job demands; that is, they reveal to what extent jobs that are rated as having high demands for one aptitude also have high demands for another. There is no reason to expect these two structures--of human abilities and of job demands--to be the same. However, it is reasonable to suppose that they are similar or consistent. To the extent that the two aptitude structures are different, there may be a less than optimal fit between what workers can do and what jobs in our economy demand. The correlations in the middle panel reflect the compromise which does in fact exist between the human aptitudes and job demands structures, because they reflect the characteristics of individuals who have been "sorted" into different occupations, presumably in part on the basis of their job-related aptitudes. The correlations above the diagonal are for average scores of people in each occupation; those below the diagonal are for estimated minimum scores (i.e., scores one standard deviation below the mean). Of the two sets of correlations, those for the lower boundary levels of the skills possessed by incumbents are probably more affected by job requirements. This is because the average skill level of workers in a job is less important than is the fact that they possess at least the minimum skills required to perform the job in a satisfactory manner.

Insert Table 3 About Here

There are other reasons to expect the different sets of correlations to differ. For example, the job ratings in the third panel are based on a more representative set of jobs than are the GATB data in the second panel, and the two sets of job ratings themselves differ in sample size and degree of aggregation. Because of both theoretical and methodological reasons, then, differences in correlations across the different sets of correlations cannot automatically be attributed to differences in reliability or validity of the GATB and the DOT rating scales. The following discussion of the various correlations will try to disentangle some of these differences in order to draw some conclusions about both the quality and the substantive meaning of the different types of data.

Looking first at the correlations among GATB test scores for individuals (the upper panel of Table 3), we see that all the aptitudes are positively correlated in both samples. The results below the diagonal are for a larger and more representative sample of people, so the following discussion will focus on them. The pattern is much the same in both samples.

Among individuals, intelligence is very highly correlated with verbal (.84) and numerical aptitude (.86); less so with spatial aptitude (.74), form perception (.61), and clerical perception (.64); and little with the three motor aptitudes (.36, .25, and .19). Spatial, form, and clerical are generally moderately highly correlated (.5 to .6) with each other and with the three other cognitive aptitudes, but spatial and form perception are more related to numerical than to verbal ability. Finger and manual dexterity have low correlations (.1 to .3) with the more intellectual abilities (intelligence, verbal, numerical, and spatial); correlations for the third motor aptitude (motor coordination) are somewhat higher (.3 to .4). All three motor aptitudes are moderately correlated to form and clerical perception and to each other (.3 to .5).

The second panel also provides data from GATB test scores, but it applies to correlations for job titles rather than for individuals. The GATB Manual (U.S. Department of Labor, 1970, Table 9-3) presents means and standard deviations on the nine aptitude scales for people training for or employed in (primarily the latter, see GATB Table 9-1) 446 different occupations. The second panel in Table 3 is based on these data.

Correlations above the diagonal are correlations among the means for the individuals in the 446 occupations. Whereas these correlations reflect the average level of aptitude in an occupation, the correlations below the diagonal better represent the minimum level of aptitude required to perform the job satisfactorily. As such, the latter are weighted more by job requirements than are the former. The 446 occupations cannot be considered a representative sample of all jobs because they overrepresent the entry-level manufacturing jobs which have been of most interest in the past to the Employment Service (cf. Miller et al., 1980, Chapter 7). The mean aptitude scores (not shown here) are several points below the 100-point population average for the more cognitive aptitudes and somewhat above average for the motor ones, which is consistent with an overrepresentation of manufacturing jobs. Nevertheless, it is useful to compare these correlations to those from the other sources of data represented in Table 3.

Correlations among the means for job titles are generally .1 to .2 higher than those just discussed for individuals. For example, the correlations between intelligence, verbal, and numerical are .9 and above for job titles vs. .8 and above for individuals. The other patterns noted for individuals are reflected in the correlations for job titles, except the correlations are higher for the titles. The correlations for the cutting points are also generally higher than for individuals, but they show a greater bifurcation between the intellectual aptitudes and the motor ones than do the other sets of correlations. As was the case for the individual-level correlations, intelligence, verbal, and numerical are very highly correlated (although there is greater correspondence between verbal and numerical attitudes in the middle panel). Spatial, form perception, and clerical perception also continue to cluster around the foregoing set of core cognitive aptitudes; correlations with each other and with intelligence, verbal, and numerical generally range between .7 and .9. Several of these peripheral cognitive aptitudes (i.e., spatial and form) continue to be more highly related to numerical than verbal aptitude. Finger and manual dexterity form an even more distinct cluster of their own in the job-level data of the middle panel, because their intercorrelation is much higher (.83 vs. .52) and they are somewhat less correlated with the intellectual cluster than was the case for the individual-level scores. The third motor aptitude, motor coordination, seems to lie between the core intellectual and the motor aptitudes because correlations with both are around .5 and are closer to .7 with some of the peripheral cognitive aptitudes (i.e., form and clerical perception). This position intermediate to the motor and intellectual aptitudes seems consistent with the definitions of the variables. Motor coordination involves not only skilled manual movements, as do finger and manual dexterity, but also greater coordination with the eyes. If this in turn requires better reaction time or more judgment, then it is likely to involve more high order processes as well.

The third panel shows correlations among job ratings rather than GATB scores. Correlations above the mean are for a 10% random sample of the 12,099 DOT job titles; those below the diagonal are for the 12,064 civilian DOT titles aggregated to the 396 census categories used in our earlier report. As already noted, the latter give less weight to the manufacturing and lower-level jobs. Both sets of correlations for job ratings present much the same picture, both differing from the correlations discussed above, although those based on the aggregated data are more striking. Instead of positive correlations among all aptitudes, there are now some negative correlations and an even greater bifurcation between the core cognitive and the motor aptitudes. The composition of the intellectual and motor clusters has changed also. Motor coordination now behaves as do the other motor aptitudes, both in its correlations to them and to the other aptitudes. Of the three aptitudes previously found to be peripheral to the core cognitive aptitudes for the job-level GATB data, only clerical perception remains. Spatial and form perception are still more highly related to numerical than verbal aptitude, but they now occupy an intermediate position between the core cognitive and the motor aptitudes. Whereas form and clerical perception were correlated over .8 with each other in the middle panel and over .5 in the upper one, their correlation is only .2 in the job ratings.

Do the differences between the different sets of correlations reveal anything about the quality of the DOT ratings upon which the Skills Map is based? That is not clear, because the differences could stem either from illusory halo or from valid differences in the structure of human and job attributes. If the ratings illustrate illusory halo, then it would be primarily of one or more of the following types: (a) motor coordination is judged as more similar to finger and manual dexterity than is true, (b) spatial and form perception are seen as more related to motor skills, and less to cognitive ones (particularly clerical perception) than is the case, and (c) cognitive and motor aptitudes are seen as less related to each other (or even as more mutually exclusive) than is the case. An alternative explanation to illusory halo is that some of these differences actually represent the structure of job demands. For example, if motor and cognitive skills are largely independent, the segregation of tasks into "head" vs. "hand" work may be convenient organizationally and optimal for selection purposes. The inherent nature of some tasks may also structure job demands somewhat differently than human abilities. For example, handling physical objects (versus dealing with people or abstract data) may often require not only manipulative motor skills (motor coordination as well as finger and manual dexterity), but also a capacity to perceive pertinent detail in objects or graphic material (form perception) and to conceptualize relations among objects in space (spatial aptitude) although the latter are more highly related to the intellectual than the motor skills people possess.

If PAQ data can be assumed to contain less illusory halo than the DOT data, then an examination of the relations among selected PAQ items might shed some light on this issue.

Despite the differences, whatever their origin, the major dimensions of job requirements they reveal are the same for the purposes of the Skills Map. General cognitive and motor aptitudes are largely separate and independent dimensions. The assignment of particular occupations to the 36 Skills Map groups might change somewhat, as would the more specific job demands noted in the appendices of the earlier report, but the overall portrait provided by the classification would not.

Criterion 2: Occupational coverage. The classification should provide comprehensive coverage of occupations in the economy.

To be most useful for program planning and for general counseling, as well as for providing an overall picture of the levels and combinations of competencies required of our labor force, a job classification must include most of the jobs in the economy. Many classifications or typologies have been developed using data on the skills required by jobs, but they generally include only a small number of jobs. To take one example, the Canada Department of Employment and Immigration (Smith, 1975) has done extensive work documenting the skills required by jobs, but this work has focussed on 76 occupations "which are generally agreed to be at the vocational levels." Reviews by Dunnette (1976), Sjogren (1971), and Pearlman (1980) cite a variety of job classifications that have been developed for purposes such as curriculum development, the organization of training programs, and validity generalization, but because of their particular objectives these studies typically are limited to particular occupations (e.g., foremen), firms (e.g., an insurance company), or government agencies (e.g., the Navy).

The archives of the PAQ contain comparable job analysis data for about 1,800 occupations, which is one reason that they were obtained for this study. When classified according to 1970 census categories, these PAQ titles represent 304 of the relevant 427 census categories. (The 427 census titles and the number of PAQ titles aggregated within each of them are provided in Appendix C.) Although quite comprehensive, both the reviews cited above and the PAQ manuals suggest that no particular effort has been made to create a general comprehensive classification of job demands, but that most classification with the PAQ is undertaken in specific settings or for other purposes (e.g., see Shaw, DeNisi, & McCormick, 1977).

DOT ratings provide the most comprehensive coverage of any job analysis system, which is why we based the Skills Map on them and used the PAQ primarily to supplement, interpret, and validate analyses with the former. When the 12,064 civilian job titles are aggregated according to the 1970 census categories, they represent 396 of the 427 relevant categories. (See Appendix C for a list.) When the census categories are weighted according to the number of workers in them, the DOT ratings cover 93.2% of all workers. Of the remaining 6.8%, occupations were not known for 6.0%, which leaves only 0.8% of workers without potential DOT ratings.

It should be noted, however, that some types of jobs are overrepresented and others are underrepresented. Census titles for which no DOT data are available are not distributed randomly (most are college professors) nor probably are the additional titles that might have been aggregated together with the others under any particular census category, thus potentially biasing the estimated DOT ratings for those census titles. The National

Academy of Science's evaluation of the DOT (Miller et al., 1980, p. 146) states that "Although the methodology used provides a standardized and relatively objective means of obtaining job data, it is time consuming and not suitable for all jobs. In particular, it can be applied most practically to manufacturing jobs, or, more generally, to any type of structured job that can be broken down into discrete tasks and performed over a limited amount of time. It is less suited to unstructured jobs, such as certain service jobs that entail widely varying tasks." The fourth edition DOT (U.S. Department of Labor, 1977a) was produced to a large extent by updating information in the third edition (U.S. Department of Labor, 1965), but as Miller et al. (p. 146) note, "These practices were efficient in some ways, but they were also rather conservative, minimizing the probability of incorporating newly emerging jobs in the DOT or of picking up changes in existing jobs." Although it is not possible to determine the sampling strategy that was in effect used for selecting organizations or specific job titles for analysis, a comparison of DOT titles to the distribution of the labor force shows that professional, clerical and sales, and service work are grossly underrepresented in the DOT whereas processing, machine trades, and benchwork are grossly overrepresented (Miller et al., 1980, p. 155). Whereas 66% of workers in 1971 were employed in the former types of work, only 24% of the DOT titles were from these categories. Jobs in large establishments are also overrepresented (p. 153). Aggregating DOT titles according to 1970 census categories probably redresses this imbalance in representation to some extent, although it would probalby still be true that ratings for service jobs are less reliable than those for manufacturing ones (Miller et al., 1980, p. 172). Despite the foregoing shortcomings, the DOT ratings provide the most comprehensive occupational coverage to date for creating the Skills Map.

The U.S. Employment Service itself has developed a 66-category classification using DOT data. (This classification supercedes several others, including the Worker Trait Group Arrangement, that the USES has developed over the years.) The USES classification, together with most of the more than 12,000 DOT titles, is presented in the *Guide for Occupational Exploration* (GOE, U.S. Department of Labor, 1977b). DOT analysts used their knowledge of traits and job characteristics to assign titles to 66 groups, and then Occupational Aptitude Patterns (OAPs) were developed for 59 of these 66 groups (as will be discussed in more detail further below). These OAPs cover 97% of the approximately 11,000 *non*-supervisory occupations listed in the GOE and DOT. Thus, the OAPs provide extensive, though not necessarily representative, coverage of occupations in the U.S. It is less clear what proportion of civilian *workers* is covered by OAPs, although it is apparently not as high as for the Skills Map because of the exclusion of an undetermined number of supervisory jobs from OAP coverage.

Criterion 3: *Aptitude coverage*. *The classification should be based on information about worker traits required*: *all important types of job-related competencies should be included and data not directly relevant to worker competencies should be excluded*.

Job-oriented, *worker-oriented*, *vs*. *attribute requirements data*. As Pearlman (1980) advises, although apparently it is infrequently implemented, careful attention must be paid to the type of job descriptor on which to build a classification. The job descriptors must fit the purpose for which they are intended. Pearlman recapitulates different types of job descriptors (as discussed, in particular, by Fleishman, 1975, and Dunnette, 1976): job-oriented content (e.g., work outcomes), worker-oriented content (e.g., human behaviors or elemental motions), attribute requirements of jobs (e.g., aptitudes), and overall nature of the job. These distinctions are not clear-cut in practice, but they are useful for evaluating the relevance of different data to one's own purposes and for comparing and interpreting results generated with different types of data.

Job demands that can be directly translated into terms that are used to assess or characterize individuals are the most directly relevant and most convenient type of data for assessing the match between people and jobs. For assessing employability, attribute requirements of jobs are clearly the most suitable. These include individual characteristics such as personality traits and interests as well as aptitudes. Although more difficult to use, worker behaviors are also useful, because they often can be treated as particular skills or manifestations of broader aptitudes or personality traits (e.g., public speaking reflects the need for verbal aptitude). And, in fact, when it comes to actually designing programs to teach skills and devices to test them, general traits have to be translated into specific behaviors (see, for example, the Generic Skills Project described by Smith, 1975).

Job-oriented content was not considered appropriate for constructing the Skills Map classification because work outcomes (rather than the abilities or behaviors required to produce them) cannot be directly linked to the assessment of individuals, something that is of paramount importance when studying employability. In addition, classifications created from job-oriented data are likely to be different than those constructed from worker-oriented data (Pearlman, 1980). Thus the inclusion of irrelevant job information might lead to a less than optimal classification for purposes of assessing employability. Attribute requirements data also have the practical advantage of being more general (i.e., having greater validity generalization) than do task descriptors; tasks tend to be more specific to different jobs and settings than are attribute requirements (Pearlman, 1980).

Several types of content are represented by the DOT variables. (See Appendix A for a list of all DOT variables.) The eleven aptitudes, the five bipolar interests, the three components of GED (reasoning, math, and language), and strength (one of the six DOT physical demands) can be considered attribute requirements and were included in the factor analyses for the Skills Map. Also included were the DOT variables which are better considered worker behaviors: the three worker functions (data, people, and things), and two of the ten temperaments (dealing with people, influencing). Because the temperaments are dichotomous variables and are not well defined, they were excluded unless there was a compelling reason to include them, so potentially relevant DOT variables such as "direction, control, and planning" were excluded from the factor analyses (although information for them was provided for them in the appendices of the earlier report). SVP and the remaining five physical demands (e.g., climbing, seeing) were excluded because they were not clearly related to job competencies as we conceptualized them; the same was true for the seven job-oriented DOT working conditions (e.g., noise, hazards).

The PAQ job elements (shown in Appendix A) measure worker-oriented content, but some elements do not seem directly relevant to job competencies and so were excluded from our analyses. None of the elements tap attribute requirements as do the DOT data, with the exception of the memory and exertion job elements. Of the total 187 job elements and several dozen dimension (factor) scores of the PAQ, we purchased the most relevant 58 job elements together with the dimension scores. (Although we refer to them simply as dimension scores, specifically, they are actually the "divisional" dimension scores created from factor analyses of separate sets of PAQ job elements rather than the broader "overall" dimension scores.) Forty-one of the job elements and ten of the dimensions scores were used in the supplementary factor analyses for the Skills Map because they reflected either competency-related worker behaviors (e.g., analyzing) or temperaments (e.g., dealing with strained personal contacts). (The ten dimension scores were used to summarize the many job elements for motor tasks that we did not purchase.) Most PAQ job conditions (e.g., cycled or repetitious work) and training requirements were excluded from the analyses but were included in Appendices C through H of the earlier report in order to to provide more specific information about individual occupations. The PAQ job elements used in the factor analyses are listed in the appendices under the headings of mental activities, motor activities, interpersonal activities, other abilities, sources of information, and vigilance.

Factor analyses of more- vs. less-relevant DOT data. The issue of excluding apparently less relevant job descriptors can be examined to some extent by comparing some results of Miller et al. (1980) to ours. They factor analyzed all 44 DOT scales (using GED alone rather than its three components separately) for a 10% random sample of fourth edition DOT titles. Thus, their analysis included all the temperaments, physical demands, and working conditions that we omitted in our Skills Map analysis. Using varimax rotation, Miller et al. obtained factors quite similar to ours. In both analyses, the variables loading highly on the first factor (and most highly on that rather than any other factor) included data, GED (or its three components), intelligence, verbal aptitude, numerical aptitude, spatial aptitude, clerical perception, and abstract or creative vs. routine work. Miller et al. labelled this first factor "substantive complexity of work;" we labelled it "academic aptitude." Their second factor, and our third, both described motor skills: involvement with things, form perception, motor coordination, finger dexterity, and manual dexterity. Their third factor is analogous to our fourth, which taps the strength required for jobs. Several of the physical demands that we excluded (e.g., stooping) loaded highly on this factor. Miller et al. characterized it as a factor measuring arduous rather than fine motor skills. Their fourth factor largely corresponds to our second, "dealing with people:" involvement with people, Depl (the temperament of dealing with people), data vs. things, business vs. science, and esteem vs. tangible products. A number of the DOT items we omitted from the factor analysis loaded highly on the Miller et al. factors, but the first four factors are the same in both analyses. Their order of importance differs because of where the extra variables loaded most highly. Nevertheless, the inclusion of the less relevant variables does not fundamentally change the factor structure of competencies reflected by the DOT and may in fact add to its interpretation. Were there to be a greater ratio of irrelevant to relevant variables, however, the factor structure would probably become a poorer representation of worker competencies.

In another study (Parcel & Mueller, 1983) an oblique factor analysis of 39 of the 44 DOT scales (excluding the five bipolar interests) for third edition titles aggregated to 419 1970 census categories was consistent with the foregoing results. That analysis revealed the same first four factors.

It appears, then, that the DOT scales provide a stable portrait of the attribute requirements of jobs despite variations in the variables included, type of factor analysis rotation (as was also demonstrated in our earlier report), edition of the DOT, or aggregation of the titles. Although this is reassuring, a more important issue is whether this stable portrait is a complete one.

DOT and PAQ Coverage of academic, motor, and interpersonal competencies. Our review of the literature on human abilities and job requirements (including, for example, Dunnette, 1976) pointed to at least three major dimensions of job competency: cognitive, interpersonal, and psychomotor skills. The DOT aptitude scales seem to represent the cognitive and motor dimensions reasonably well. Three DOT variables reflect dealings with people, but on the whole the DOT is very poor for characterizing jobs according to their interpersonal skills. As Miller et al.'s (1980) evaluation of the DOT notes, the DOT scales are not well suited to many non-manufacturing jobs, jobs that are less likely than service ones to demand interpersonal skills. The PAQ includes many behaviors in the interpersonal as well as the cognitive and motor domains, although our earlier report concluded that lower-level interpersonal behaviors or skills are not well represented by the PAQ.

Together, the DOT and PAQ provide a valuable look at job demands because they sample aptitudes or behaviors from the three dimensions of competency we deemed, a priori, to be most important for understanding job demands. Nevertheless, it is not clear that they are comprehensive in their coverage of all important types of worker traits. In particular, analyses of worker traits and behaviors important in particular jobs, such as in the critical incident studies cited by Dunnette (1976), reveal some worker-oriented content (e.g., poise, cooperating with coworkers) not reflected by the DOT or PAQ. Although one might not consider traits such as poise to be aptitudes in the usual sense in which the term is used, they nevertheless appear to be important to job performance in some jobs and thus important to assessing employability.

Aptitude factors in high-level work as revealed by the Gilman data. Additional data were collected to examine this issue, data which will hereafter be referred to as the Gilman data. As described in detail elsewhere (Gottfredson, Finucci, & Childs, 1982), several hundred alumni from 1940 through 1979 of a private secondary school (the Gilman School in Baltimore) were surveyed in adulthood to examine their career outcomes. These men were asked to rate how critical each of 37 worker traits is for performing their own jobs well. This list was created to tap the major types of traits that appeared in reports of critical incident studies of particular occupations (e.g., see Dunnette, 1976) as well as abilities identified in other analyses of job requirements and human abilities. Several social resources (e.g., good contacts) were included as well. About 95% of the respondents held professional, managerial, or sales jobs. Although the sample is not representative of all types of work, it is particularly valuable because it represents the types of work that the DOT is probably poorest in describing.

The Gilman data were factor analyzed to examine the structure of work competencies underlying the respondents' jobs, and then several general groups of jobs as well as a number of specific occupations were examined in detail. Table 4 shows the results of a factor analysis (varimax rotation, N=290) of the 37 worker traits or behaviors. The sample used for the factor analysis included only men aged 26-55 who were not students, and thus men who presumably were established in their careers. The DOT temperament Depl (dealing with people) and occupational prestige were also included in the factor analysis as marker variables for the "dealing with people" and the "academic aptitude" factors found in the Skills Map analysis. Six factors had eigenvalues of at least 1.0; these are shown in Table 4. Those factors are: (I) good personal presentation (e.g., be tactful and considerate, be attractive and well groomed, have poise, have integrity), (II) well organized and responsible (e.g., plan ahead and anticipate problems, coordinate and schedule activities, spot and tackle problems quickly, visualize things before completion), (III) physically coordinated (have physical coordination, have manual dexterity, have physical strength and endurance), (IV) well educated (have higher degree or credential, give information by writing, reports, etc., have attended the right college, get information by reading), (V) creative (have a lot of ideas, think of new approaches to problems), and (VI) competitive (be competitive, have good contacts).

To help interpret the foregoing factors, Appendix D presents more detailed data. Table D-1 tests for the significance of differences in responses to the 37 traits by three general types of workers (professional, managerial, and sales) and by men in four specific occupations (physician, lawyer, VP/President/CEO, and other managers, n.e.c.). Tables D-2 through D-14 indicate which traits are the most and least critical for good job performance in thirteen occupations. As the appendix indicates, all but one of the occupations in Tables D-2 through D-14 is classified as very high on the academic aptitude factor (i.e., in Groups 28-36).

The "well educated" factor corresponds roughly to the "academic aptitudes" factor in the Skills Map, both because of its apparent emphasis on academic skills such as reading and writing and because of its high correlation with prestige. The "well organized and responsible" factor essentially reflects being a good manager, though without the usual connotation of managing people. Many of the items in this factor are quite similar to those in the PAQ such as analyzing information, decision making, reasoning, and planning. When the PAQ and DOT items were factor analyzed together, the items just mentioned loaded highly on the "academic aptitude" factor (see the earlier report). When dealing primarily with high-level jobs, academic vs. managerial competence appears to be an important distinction. When specific occupations are examined, for example, the items in the "well educated" factor are reported as critical by most lawyers (Table D-3) but the managerial items are less important; for physicians (D-14), both seem to be critical; and stock and bond salesmen (D-10), school administrators (D-6), and presidents/CEOs (D-8) are high on the managerial/organizational factor but low (relative to other high-level jobs) on the academic one.

"Good personal presentation" is the factor most highly associated with the DOT variable "dealing with people." The items of this factor are critical for stock and bond salesmen (D-10); important but somewhat less critical for secondary teachers (D-13), insurance agents (D-9), lawyers (D-3), school administrators (D-6), and various types of managers (D-5, D-7, D-8); helpful but not critical for architects (D-12), engineers (D-11), physicians (D-14), and elementary teachers (D-2); and unimportant for editors and reporters (D-4). Although this factor is related to dealing with people, it appears to mean primarily dealing with people to persuade or motivate under conditions without authority. Jobs involving interaction without attempts to persuade (e.g., a reporter gathering information) or involving persuasion with actual or perceived authority (e.g., physicians and elementary teachers) are low on this factor. As Table D-1 shows, it is more important for salesmen than for managers and less important for the typical professional.

Because personal presentation is more important for workers who are not perceived as possessing either authority or expertise, this factor would be expected to also distinguish among different types of lower- and moderate-level jobs dealing with people. The particular interpersonal skills associated with the personal presentation factor might differ at different job levels (i.e., different Skills Map academic levels), however. For instance, among lower-level jobs dealing with people, interactions are probably more routine and deference rather than persuasiveness is probably the more important trait. Following orders and cooperating with coworkers did form an additional but unimportant factor (not shown in Table 4) which might have been quite important if a wider range of jobs had been included in the sample. Critical incident analyses of jobs such as foreman, fire fighter, and police officer (see Dunnette's, 1976, review) suggest that this would be expected. There are few items in either the DOT or PAQ which tap this particular interpersonal factor. Most of the items dealing with people are the types of interpersonal activities found most often in high-level jobs (e.g., advising, negotiating), probably partly accounting for why they loaded highly on the academic aptitude factor in the Skills Map analysis. Only items such as entertaining, catering, behavior as a source of information, and social welfare versus machines loaded highly on the dealing with people factor in the Skills Map.

The "being competitive" factor is distinct from the personal presentation factor, although they both tend to be particularly important for salesmen versus managers and professionals (Table D-1). Being competitive is also important for editors and reporters (D-4), indicating that it applies not only to sales situations but also to any situation where establishing priority is important. Thus, while competitiveness may often accompany jobs dealing with people (such as sales), it may be important in a great variety of types of work. Creativity (the need for new or many ideas) is very helpful in jobs such as elementary teacher (D-2), architect (D-12), engineer (D-11), and school administrator (D-6), and less important for the probably more routinized activities of insurance agents (D-9). Finally, the physical coordination factor corresponds roughly to the "motor skills" factor in the Skills Map.

In summary, the foregoing data confirm the importance of the academic, people, and motor aptitude factors of the Skills Map. However the factor structure shown in Table 4 suggests that the Skills Map does not embody some major distinctions among jobs, at least among predominantly high-level ones. Creativity and competitiveness are two types of traits not included in the PAQ or DOT data on which the Skills Map was based, although creativity or ideational fluency has been proposed as a major dimension of human ability (e.g., see Dunnette, 1976). The DOT interest in creative or abstract vs. routine work is not a good measure of creativity and appears to reflect general intellectual level. Also, organizational and academic ability tend to be distinct skills among high-level jobs, but this distinction is not made in the Skills Map even though both types of variables are present. The skills map does make a meaningful distinction between people-related and non-people jobs, but neither the DOT nor PAQ provide much information about what sort of interpersonal skills or behavior are required in "people" jobs, particularly in the low- and moderate-level (i.e., academic level) jobs. Referring back to Figure 1, it can be seen that most of the high and very high academic level jobs are classified as high on the people factor, but they form heterogeneous groups not well distinguished by the other two factors (i.e., by academic or motor skills). For example, 11 of the 13 occupations shown in Appendix D are in Skills Map groups high in their dealings with people, 8 are in one group alone (Group 30), but a glance at the tables in Appendix D shows that their job demands differ considerably along the dimensions shown in Table 4. As noted earlier, for example, good personal presentation is not critical for editors and reporters but it is for stock and bond salesmen. And although all but one of the occupations described in Appendix D is classified as very high in academic aptitude in the Skills Map, they differ in how well educated the workers must be. This is consistent with other research on managerial sales vs. other types of work (Gottfredson & Brown, 1981; Gottfredson, 1978).

The question is how to incorporate additional meaningful distinctions into the Skills Map. Adding even one more factor to the present Skills Map structure would make it unwieldy. One solution may be to supplement the Skills Map with "sub-maps." If the three-dimensional Skills Map as presented in Figure 1 is assumed to present a "first cut" showing only the _most_ important distinctions among _all_ jobs in the economy, then it is probably a valid portrait. As already suggested, the additional distinctions to be made among jobs may differ according to the broad academic level being considered. For example, it might be useful to present sub-maps for each of the four academic aptitude levels of the Skills Map. The factor structure shown in Table 4 for high-level jobs provides a guide for one such sub-map. Whereas the sub-map for very-high academic level work might focus on differences in interpersonal, managerial, and academic skills, sub-maps for low-level jobs would probably concentrate more on differences in psychomotor skills because only a small proportion of those jobs have any substantial involvement with people.

Although the DOT and PAQ data would be useful for this purpose, new data are desirable. In particular, much more attention needs to be paid to interpersonal skills, many of which are conceptualized as personality traits rather than as aptitudes. Past research has generally found only low validities for predicting job performance for personality traits (e.g., Guion & Gottier, 1965; Lent, Aurbach, & Levin, 1971; Ghiselli, 1973), but that research has not been guided by a theory of job-related competencies. We would expect only certain personality traits to be directly related to job performance, and even those would be important only in particular types of jobs (e.g., in jobs dealing with people). Related work on the social skills important in managerial, sales, and other work (e.g., Argyle, 1981) might be helpful in guiding the selection of traits for a more comprehensive examination of job competency requirements in all types of work.

Criterion 4: Comprehensible map. The classification should provide a meaningful and readily comprehensible map for grasping the major differences among the competencies required by different jobs.

Rational vs. empirical methods and face validity. The method of analysis used to produce the classification should be clearly documented and methodologically defensible. The results should also be consistent with other well-established knowledge of job differences. Both are important for establishing the comprehensibility and meaningfulness (i.e., construct validity) of the classification. For practical application, however, additional care must be devoted to making the scheme look clear and sensible. For example, the structure underlying the classification (e.g., the types of differences and similarities it shows) should be obvious. Or, the groups should "make sense" and be few enough in number to present a memorable or coherent display. The analogy to a map is meant to illustrate the idea of being able to see the relation between different occupational groups or clusters in an occupational classification, that is, to get an idea not only of the ways in which occupations differ or are similar but also of how "far apart" they are along these dimensions. This means that the classification should either be monothetic (i.e., groups are defined in terms of a unique combination of values on a usually small set of attributes) or else it should be polythetic (i.e., groups share a large proportion of their properties but do not necessarily agree on any one property) with an additional analysis to show extent of overlap or the major types of distinctions among the groups. With these specific quidelines in mind, the following pages will assess the Skills Map on the criterion of being a comprehensible and meaningful map.

To some extent clear documentation and defensibility of classification procedures may be inconsistent with the meaningfulness and comprehensibility of the resulting classificatory scheme. Cluster analysis is often used to create occupational classifications or typologies, but differences between the groups seldom are intuitively clear. Factor analyses can be done to identify the major dimensions of aptitude underlying a set of job attribute ratings, and then groups can then be created using factor scores on one or more of the emergent dimensions. The differences among the resulting groups are clearer than among groups created through cluster analysis, and so create a more comprehensible "map," but they are still somewhat difficult to comprehend. A specific example of the drawbacks of purely empirical procedures is provided by the USES. For several decades the U.S. Employment Service used strictly empirical methods for identifying worker trait groups, but the successive classifications were very sensitive to the instability of the Specific Aptitude Test Batteries (SATBs) used to describe jobs, coverage was limited because of the limited number of SATBs available, and many of the resultant groups were not meaningful (e.g., see comments in the OAP Manual on the 1970 OAP structure, U.S. Department of Labor, 1980a, p. 4). The most recent USES classificatory scheme is primarily a rationally-based one. Analysts created face-valid groups largely on the basis of their knowledge about jobs, although they were guided by empirical analyses of the major differences in vocational interests required by jobs. Occupational Aptitude Patterns were developed to summarize aptitude patterns in most of these groups. The more recent and largely rationally-based scheme is more comprehensive, comprehensible, stable, and flexible than the earlier ones. The drawbacks are that the process of creating the classification is not clear (i.e., replicable or "objective") nor does the resulting classification constitute a map in the sense described earlier even though the individual groups are face-valid meaningful groups. Both rational and empirical methods have advantages and disadvantages and there is certainly no consensus that one is to be preferred exclusively to the other. A compromise tailored to one's specific needs is probably best.

To create the Skills Map, we opted for a rational modification of an empirical method. Factor analyses were performed to identify the major dimensions that the Skills Map should incorporate. As described earlier, the first three factors were selected: academic, people, and motor competencies. Meaningful variables were then selected to represent those factors. The variables selected were those that loaded highly on the factors they were to represent _and_ which would be meaningful to potential users of the Skills Map. Taking the academic aptitudes dimension as an example, it seemed more meaningful to use the average of the verbal and numerical aptitude ratings to characterize occupations along this dimension than to create factor scores. (Those two variables correlated .89 and .92 with the academic competencies factor.) The former has a more direct educational meaning than the factor scores. Using this method, the three resulting dimensions are no longer orthogonal, but they need not be, and correlated factors may better represent reality than statistically independent ones. In summary, the structure underlying the classificaton is clear and additional occupations could easily be added as long as they have scores on the six DOT variables used to define the three dimensions.

The three competency dimensions were divided into several substantively meaningful levels in order to create a set of occupational groups, as was described earlier. (See Appendix A for the cutting points used to create the different levels.) The levels were established to make as much distinction as possible without becoming unwieldy. The result was 36 groups, a manageable number considering the clarity of the similarities and differences among them.

There are several immediately apparent problems with the resulting groups, however. One is that the occupations within any particular group do not always seem to belong together (see Figure 1 or Appendix B). The face validity of the groups depends on the general impressions and knowledge that the user has about how jobs are similar or different. Although such reactions probably depend on the overall nature of the job (that is, they probably reflect a personal polythetic view of jobs) rather than just on the (more relevant) worker-oriented content, they nevertheless raise doubts about the acceptance and the practical utility of the classification scheme. Groups 19, 23, 26, and 35 seem particularly heterogeneous. Other groups fall into a few coherent subgroups. Group 24, for example, includes several jobs such as cashier that deal with people in routine, nonstressful ways as well as others (such as several types of teachers) that require more responsibility and more complex and stressful dealings with people. To take another example, Group 27 includes several jobs such as therapy assistant which require dealing with people primarily as physical objects as well as including clerical workers such as secretary who deal with people primarily for routine exchange of information and business detail. Some such heterogeneity is an inevitable outcome of limiting the number of dimensions along which to distinguish among occupations. Sub-maps were suggested above as one way of displaying important secondary differences.

Another problem is that the "moderate people" level does not seem very useful; it might be better to divide the "dealing with people" factor into only two levels. A reexamination and modification of cutting points for the different levels might improve the appearance of intra-group homogeneity as well as consolidating the three "people" divisions into two. This would also have the advantage of reducing the number of groups by one-third or allowing the incorporation of other distinctions into the map without increasing the current number of groups. As already illustrated, and as will be discussed more extensively below, it would be useful to distinguish between the types of interpersonal activities required in jobs that do deal extensively with people.

Finally, the dimensions of the Skills Map obscure some important differences among jobs unless one examines the more detailed data in the appendices. Most important is the distinction between requirements for math and verbal aptitude. Both numerical and verbal aptitude are weighted equally in the "academic aptitude" dimension underlying the Skills Map, but it is apparent from the descriptions of the 36 groups (in Appendix B in the present report) that some groups of jobs emphasize one aptitude rather than the other. In particular, most of the groups with high dealings with people (and that are at least moderate on the academic dimension) require higher verbal than numerical aptitude (i.e., the percentiles for verbal are higher than those for numerical in Appendix C of the earlier report). Conversely, numerical aptitude is more important in the groups with only moderate or low dealings with people. In fact, the earlier report (Table 4) revealed that when factor analyses were performed separately for occupations divided into three levels of academic aptitude, separate math and verbal factors were found for the middle group. Although it is not made explicit in the Skills Map, this distinction between numerical and verbal domination is important for both practical and theoretical purposes.

(*) See Note on p. 104 concerning this section

Comparison of the Skills Map to the USES occupational classification. The meaningfulness of the scheme can be assessed, and perhaps augmented, by contrasting it with related work. The following pages examine another classification based to a large extent on DOT ratings--the 66-category classification developed by the U.S. Employment Service and published in the Guide for Occupational Exploration (GOE, U.S. Department of Labor, 1979a). As already noted, the GOE classification is the only other comprehensive classification that characterizes occupations according to the aptitudes they require. That system as published has several major limitations for purposes of assessing employability, but it is very instructive to compare the occupational map emerging from that classification to the Skills Map. A brief description of how that classification was created is necessary in order to better compare it with the Skills Map.

The major steps in creating the GOE classification were as follows. A factor analysis of vocational interest items revealed eleven major dimensions of vocational interest. Job analysts then assigned all DOT occupations to one of eleven Interest Areas on the basis of their knowledge of those occupations. A twelfth Interest Area was added because some occupations did not fit well in any of the eleven areas. These twelve Interest Areas were subdivided by the job analysts into more homogeneous groups, resulting in a total of 66 Work Groups as presented in the GOE. As noted earlier, the procedure is largely a rational rather than an empirical one based on job analysts' familiarity with tasks, working conditions, and interest and temperament requirements as well as aptitude requirements. (See Droege & Hawk, 1977; Strohmenger & Padgett, 1979; Droege & Padgett, 1979; U.S. Department of Labor, 1982a for a description of the GOE and its development.)

Occupational Aptitude Patterns (OAPs) were then developed for the Work Groups as follows. Specific Aptitude Test Batteries (SATBs) had been developed for over 400 specific occupations. A total of 460 such SATBs were classified into the 66 GOE Work Groups. The SATB profiles varied from occupation to occupation within any one group, so a modal SATB was produced to represent as many of the 66 groups as possible. Data were sufficient to create modal patterns for 31 of the Work Groups. (The list of SATBs provided in Appendix F to a large extent overlaps these 460 SATBs. Section II-A of the GATB Manual lists which specific SATBs were included in the OAP development.) These modal SATBs were used together with the DOT ratings for the same occupations to develop a way of predicting modal SATBs from DOT data. This was done because DOT ratings are available for all 12,099 DOT occupations, and so provide a means to create modal SATBs for all the Work Groups. First, cutting scores were developed separately for each aptitude from the DOT ratings. (Cutting scores refer to the minimum level of the aptitude necessary for satisfactory job performance. Applicants must meet all cutting scores on the designated aptitudes to be considered good candidates for the job.) Then the presence or absence of each aptitude was predicted, the aim being to represent each group with two to four aptitudes. No more than four aptitudes are ever selected when creating SATBs for individual occupations or OAPs for groups of them, even though more may be valid predictors, because a fifth aptitude rarely improves the prediction of job performance very much (U. S. Department of Labor, 1969). The resulting modal SATBs for all 66 Work Groups, together with the predicted SATBs for individual occupations, were reviewed and modifications in the modal SATBs (i.e., OAPs) were made in some cases. The major changes were to exclude occupations with certain data codes (i.e., the higher codes for dealing with data) from the OAP groups (meaning that some OAP groups are a somewhat smaller subset of the analogous GOE Work Groups). In addition, it was found that the predicted SATBs were too heterogeneous for 14 of the Work Groups for them to be well represented by a single OAP. For seven of the groups, two different OAPs were developed. No OAPs were retained for the other seven. As a result there are 66 OAPs representing 59 of the GOE Work Groups. With the exception of some customer service occupations such as waiter (GOE Group 09.04), most of the excluded occupations are either supervisory (e.g., farm supervisor) or unusual (e.g., model, psychic reader, athlete, juggler). (See U.S. Department of Labor, 1980a; Droege & Boese, 1982, for descriptions of the development of the OAP groups.)

One section of the GATB Manual (U.S. Department of Labor, 1979b) presents the 66 OAP groups together with a list of the occupations of most interest in each of them (a total of 2,556 occupations). Although this publication is a valuable adjunct to the GOE, it does not provide a readily comprehensible map of the similarities and differences among the 66 occupational groups, thus limiting its usefulness for both theoretical and practical purposes. Inspection of the OAPs reveals, however, that many of them are identical or quite similar. Table 5 reorganizes the OAPs to highlight their similarities and in so doing reveals a very interesting occupational map. All OAP (i.e., GOE) groups with similar or identical OAPs are listed together in Table 5 under one of eleven headings labelled here as Clusters A through K. Figure 2 further summarizes and schematizes the data in Table 5 and makes clearer the relation of the clusters to one another. It should be noted at the outset, however, that this portrait highlights the consistencies and ignores the variability shown in the more detailed data (Table 5 and Appendices E and F) upon which the figure is based.

Insert Table 5 and Figure 2 About Here

Figure 2 groups the eleven clusters into four major sectors or foci of work: dealing with physical relations, maintaining bureaucratic order, dealing with social and economic relations, and performing. The information shown for each cluster includes a summary of the major focus of work, sample occupations, and the level of the most important aptitudes (i.e., the OAP) the work requires. Work focus was inferred from examining descriptions of the GOE groups and lists of the occupations they include. Appendix E reproduces the lists of occupations provided in the manual for the OAP groups (U.S. Department of Labor, 1979b), but it reorders them to be consistent with Table 5. The aptitudes noted in the cluster profiles in Figure 2 are those that were most typical of the constituent GOE groups (see Table 5). The level required of each important aptitude is noted simply as minimal, average, above average, or high in the figure (see the key in Figure 2 for details).

The following pages describe the similarities and differences among occupational clusters based on OAPs.

Clusters A to D: Dealing with Physical Relations. Clusters A through D include jobs whose workers deal with physical systems, be they mechanical or biological. They range from those requiring high intelligence and quantitative abilities to those requiring only physical skills. On the DOT worker function scales of "complexity of dealing with things" and "complexity of dealing with data" they probably range from very complex (Cluster A) to very simple (Cluster D). Likewise, they appear to range from high or above average to average or low on requirements for intelligence, verbal, numerical, and spatial aptitudes. Motor skills are important predictors of job performance only in the two manual work clusters.

Cluster A includes mathematics, physical sciences, medicine, and engineering. These occupations require high intelligence, but they are distinctive from all other clusters for their high demands for numerical and spatial skills.

Cluster B represents technological occupations: managing operating systems (e.g., production superintendent), implementing general design specifications (e.g., drafting), and operating complex vehicles (e.g., aircraft). Although not as demanding as the Cluster A occupations, they too stress quantitative rather than verbal cognitive skills.

Cluster C includes craftsmen and many machine operatives. These include workers who create, assemble, or inspect various types of goods and who set up or operate machines to produce, transform, or transport goods. Most would be considered skilled or semiskilled workers. Although the jobs require form perception and manual dexterity, one subcluster requires the ability to deal with or think about the relations of objects in space (spatial aptitude) and the other requires motor (eye-hand) coordination for quick, accurate manipulations.

Cluster D consists of what is often characterized as semiskilled or unskilled manual work. These jobs require only minimal levels of motor coordination and manual dexterity in order to perform manual or farm labor, tend or feed machines, assemble objects, help more skilled workers, or provide elementary services to the public (e.g., shining shoes).

Clusters E to G: Dealing with Social and Economic Relations. Whereas some of the clusters dealing with physical systems had high demands for quantitative versus verbal aptitude, Groups E to G have more balanced demands. They do not require the spatial aptitude typically associated with the physical sciences and technical work. Instead, they often require clerical perception, which is the ability to perceive pertinent detail in verbal or tabular material. These three clusters range from high (Cluster E) to at least average (Cluster G) in intelligence required. Also, they probably range from more to less complex in their dealings with people and data (two of the DOT worker functions). None of the OAP groups included within these clusters requires any spatial or motor aptitudes, which is the major difference between these three clusters and the four just discussed.

Cluster E includes social scientists, administrators, and professionals who help clients deal with the social system (e.g., lawyers, lobbyists). These occupations require high intelligence and above average verbal and numerical abilities. Thus, they appear to be somewhat less demanding in this regard than are the Cluster A occupations which include math, medicine, and the physical sciences.

Cluster F occupations include a variety of types of work activities---teaching and nursing, disseminating news and information, selling, and business management--but the aptitudes are much the same. They require above average intelligence, verbal aptitude, and usually clerical perception, and average numerical aptitude. Thus they are somewhat less demanding cognitively than are the Cluster E occupations.

Cluster G workers serve or care for people in a variety of ways: hospitality (e.g., flight attendant), child and adult care (e.g., practical nurse), and security (e.g., some police officers). They also include animal trainers. All require average intelligence, but apparently no other GATB aptitude is important in predicting job performance.

Clusters H to J: Maintaining Bureaucratic Order. These clusters constitute the records keepers and rules keepers of all other activities, and they carry out many of the minor transactions for the organization. The required aptitudes differ, ranging from purely cognitive to primarily noncognitive.

Cluster H includes occupations whose workers inspect work processes and products for conformity to government rules and regulations, as well as clerks, secretaries, tellers, cashiers, and salespeople. These jobs require average intelligence, numerical ability, and clerical perception. The requirements are much the same, although slightly lower, as those for Cluster F (persuading, informing, and helping individuals), except that Cluster H has no particular demand for verbal aptitude. Various police and fire officers (other than those in Cluster G) are included in this cluster even though their aptitude pattern resembles that of the next cluster (which also requires intelligence and clerical aptitude but not numerical aptitude), because it seemed to be a more sensible assignment.

Whereas Cluster H occupations maintain bureaucratic rules, records, and transactions, Cluster I occupations primarily process (e.g., claims clerk) or orally transmit (e.g., dispatcher) bureaucratic detail. These occupations require average intelligence and clerical perception.

Cluster J occupations are distinctive from those in Cluster I by requiring less cognitive and more physical processing of records. They include, for example, clerical machine operators. Cluster J occupations require average clerical perception and minimal manual dexterity.

Cluster K: Performing These occupations require above average intelligence, but the other aptitude requirements create two subclusters: music, literary arts, and drama which tend to require verbal aptitude and clerical perception (both above average), and dance and visual arts which require spatial aptitude (average or above).

The OAP clusters are clearly a meaningful way of distinguishing the aptitude requirements of different types of occupations. The important question in the context of this report is: To what extent do the OAP clusters and the Skills Map groups provide consistent or complementary views of occupational demands?

In order to answer this question, half of the occupations in Appendix E (Appendix E shows specific occupational titles included in each of the OAP clusters) were classified according to census category (using the Classified Index of Industries and Occupations, U.S. Bureau of the Census, 1971) and then according to Skills Map aptitude group (using the census code and Appendix C). Many supervisory occupations are not included in the OAP data, but overlap of coverage of the two schemes is quite good otherwise.

Table 6 provides a summary of this cross classification procedure by showing the predominant OAP clusters appearing within each of the Skills Map aptitude groups. To aid interpretation, results are listed separately by major focus of work--physical relations, social relations, and bureaucratic relations. Cluster K, the performing occupations, is not included in the figure but will be mentioned later.

Insert Table 6 About Here

Looking first at the results for the Physical Relations clusters (A-D), it is apparent that they differ systematically with the general level of academic aptitude required according to the DOT ratings. The very high academic aptitude level is represented primarily by Cluster A, high academic aptitude by Cluster B, moderate academic aptitude by Subcluster C1, and the lowest level by Clusters C1, C2, and D. Neither the motor nor the dealing with people dimensions seem to distinguish among the four clusters, although it is the case that C1, C2, and B are not found among the "low motor" aptitude groups.

Turning to the Social and Economic Relations clusters (E-G), the academic dimension once again distinguishes among the clusters. In contrast to the wide range of cognitive demands among Clusters A to D, dealing with social and economic relations, except in a serving capacity (Cluster G), requires at least above average intelligence. Although the three clusters are found at all Skills Map levels of motor skill and involvement with people, they tend to fall toward the lower end of the motor skills dimension.

The three Bureaucratic Relations clusters (I-J) are found only at the moderate and high academic aptitude levels of the Skills Map, the high level being represented primarily by Cluster H. They tend not to be high on the Skills Map motor aptitudes dimension. Cluster J (manipulating records) does not have high involvement with people whereas Cluster H tends to. Overall, however, the three clusters are not distinguished well by either the motor aptitude or people dimensions of the Skills Map. In summary, Table 6 shows that there is clear differentiation among the OAP clusters by academic aptitude level in ways consistent with the OAP cutting points. The other two dimensions of the Skills Map are only somewhat related to the OAP clusters.

The next table affords a better assessment of how consistent the OAP clusters and the Skills Map aptitude groups are, as well as disclosing additional information not available from either scheme alone. Because the motor and dealing with people dimensions did not distinguish clusters well, they have been ignored in Table 7. Table 7 lists the summary aptitude requirements for the clusters predominating at each of the four Skills Map aptitude levels and the three OAP foci of work.

Insert Table 7 About Here

The pattern of requirements shown in Table 7 reveals the effects of using different types of occupational comparisons even when the job descriptors are basically the same. The Skills Map is based on inter-occupational comparisons because it classifies all occupations on the basis of their scores relative to one another on the same three dimensions, dimensions that were selected precisely because they distinguished well among occupations. In contrast, OAPs were developed from SATBs, which in turn are based on intra-occupational comparisons of the value of different aptitudes in predicting job performance. Interoccupational comparisons with OAPs are limited to determining which aptitudes are most related to job performance. If the same aptitudes are important in two occupations, then the cutting scores can also be compared. One effect of the difference between data based on inter- versus intraoccupational comparisons is apparent from looking at the OAP aptitudes for the Physical Relations clusters.

Cluster B occupations require above average cognitive skills according to their OAPs and "high" academic aptitude according to the Skills Map; results are also consistent for Cluster A occupations because they require even higher cognitive aptitude according to both schemes. Although the Skills Map makes distinctions among occupations within Clusters A and B according to the two other competency dimensions (motor skills and involvement with people), the OAPs do not. Even though some workers in these OAP clusters may exercise relatively high motor skills, their importance for job performance is probably secondary to the cognitive skills and therefore given no opportunity to show up in the OAPs because the OAPs emphasize the most important aptitudes and because no more than four aptitudes are ever included in an OAP. Because the OAPs do not incorporate any clear measures of interpersonal aptitude, there is no reason to expect OAPs to be able to distinguish among jobs dealing with people and those that do not in the Physical Relations clusters. What the OAPs show, then, is the skills that are most important (among those assessed by the GATB) while the Skills Map shows the level of the skill exercised, important or not.

Whereas only cognitive skills are represented in the relatively high level Clusters A and B, only motor skills or the more peripheral cognitive skills (form perception and spatial aptitude) are important in the lower level Clusters C1, C2, and D. In fact, it is only by cross classifying the OAP clusters by Skills Map group that it is possible to estimate what the typical academic aptitude is in clusters C1, C2, or D. It appears that these three clusters do not require more than an average level of intelligence or academic aptitude and that it is the motor skills that best predict job performance.

In the Social Relations clusters (E-G), no motor aptitudes are important in even the lowest level cluster (G), so a clear progression in level of intelligence required has a chance to appear: high for E, above average for F, and average for G.

Turning to the Bureaucratic Relations clusters (H-J), motor skills show up in only one cluster (J). Only cognitive aptitudes are most important in the other two clusters, both of which require at least average intelligence.

Looking across all three OAP foci of work, it also appears that the cutting point on any aptitude, whether cognitive or not, is related to level of academic aptitude on the Skills Map. For example, Clusters C1, C2, and D are low on the academic aptitude dimension and require only minimal motor skills, even though differences in motor skills are important according to the OAP. This pattern does not appear to be an artifact of the procedure used to develop modal OAPs. Both the OAP manual (U.S. Department of Labor, 1980a, Table 9) and the list of several hundred SATBs (reorganized in Appendix F according to OAP cluster) reveal that few occupations require more than minimal motor aptitude, even when motor aptitudes are the most important ones for predicting job performance. They also show that this is not the case for the cognitive skills because the cutting scores for the latter range all the way from minimal to high. In addition, if intelligence does appear in a SATB together with a motor aptitude, the cutting score for intelligence also tends to be low.

The Skills Map shows occupations in three levels of motor skill, but the OAP clusters do not because no GOE group requires more than minimal motor skills. Reference to Table 1 and Appendix F may help explain this inconsistency. Among the low and moderate academic groups in the Skills Map, there are few occupations rated as anything other than moderate in their demands for motor aptitude; that is, there is little variance in these DOT aptitude ratings (see Table 1). The SATB´s that are available for specific occupations within the relevant OAP clusters (C1, C2, and D) show a similar pattern of very few low or high scoring occupations within each of those clusters (see Appendix F). Thus, although variation in the cutting scores for motor aptitude requirements does exist according to the SATB´s, it is not large enough to affect the OAPs for the GOE groups where motor aptitude is a useful job predictor. Ironically, the GOE groups where higher cutting scores for motor aptitude might be found tend to be occupations where cognitive skills are most important and so dominate the OAPs. Table 1 shows, for example, that the largest Skills Map group with high motor skills is Group 27; it employs 4% of workers. This group is also high on both the academic aptitude and dealing with people dimensions, and includes occupations such as secretary and chiropractor. An examination of the SATB publications for individual occupations might shed some light on this apparent inconsistency between the OAP clusters and the Skills Map, because those publications document how the OAPs were constructed from various assessments of the importance of all nine of the GATB aptitudes.

Table 7 shows that intelligence and numerical aptitude are core skills in all three OAP foci at the two highest Skills Map academic levels, but that the auxilliary skills differ by OAP focus of work in ways that make sense but which were not all apparent in the Skills Map analysis. The Physical Relations clusters (at the two highest levels) are more quantitative than other high level OAP clusters. Verbal aptitude is important in more of the Social Relations clusters than in the other foci. Only the highest level Physical Relations cluster (A) has a requirement for verbal aptitude. Although a numerical vs. verbal distinction was not built into the Skills Map, it was readily apparent in the resulting Skills Map groups. What was less emphasized was that spatial aptitude is typically associated with the dominance of quantitative aptitude.

The OAP clusters show another variation in the types of cognitive skills required in different kinds of work where above average intelligence is required. The ability to perceive pertinent detail in verbal or tabular material (clerical perception) is important in both the Social and Bureaucratic Relations clusters, but not in the Physical Relations ones. This distinction was not explicitly noted in the Skills Map analyses, but it is consistent with the earlier discussion of the heterogeneity of some of the Skills Map groups. In particular, a number of the groups appear to contain clerical vs. non-clerical subgroups.

Turning to the two lower levels of academic aptitude, only motor skills, form perception, and spatial aptitude are required in the Physical Relations clusters. With the exception of manual dexterity in the relatively low level Bureaucratic Cluster J (manipulating records), these aptitudes are not required for the lower level Social and Bureaucratic clusters. At least average intelligence and clerical perception tend to be the requirements in the latter.

A comparison of the Skills Map to the OAP clusters shows that "dealing with people" is not the same as "dealing with social and economic relations." With the exception of Clusters C2 (quick, accurate manipulation in crafts, etc.) and J (manipulating records), all OAP clusters contain occupations where workers deal with people. Conversely, with the exception of Clusters F (persuading, informing, and helping individuals) and G (serving and caring for individuals) all contain occupations that do not have substantial dealings with people. The low relation between these two dimensions focuses attention on differences in the types of dealings with people different types of workers have. Many of the workers in the Dealing with Physical Relations clusters who deal with people probably deal with people primarily as physical objects (e.g., physician, barber, bus driver, elevator operator). Many workers in the Bureaucratic Relatons clusters who deal with people probably do so by exchanging information, perhaps to facilitate some routine exchange (e.g., sales clerk, secretary, bank teller, operator, receptionist). Workers who deal with people in all their complexity are found primarily in the Social and Economic Relations clusters (e.g., lawyer, social worker, teacher, manager). Maintaining social and economic relations does not necessarily involve extensive dealings with people (e.g., accountant, librarian, political scientist), but it usually does.

Neither the Skills Map nor the OAP clusters deal well with artistic occupations. They are scattered throughout the Skills Map and the OAPs for Cluster K (performing) are heterogeneous. The inadequacies of the DOT and GATB aptitude scales for describing occupations in general have been noted above, but apparently they are more severe for artistic and aesthetic occupations. The OAP clusters, however, are somewhat more meaningful for describing such jobs than is the Skills Map.

To summarize, both the Skills Map and the OAP map created here are meaningful and comprehensible, but in different ways. A major distinction according to cognitive or academic aptitude is made by both, but the other distinctions they emphasize are different. But because they are largely consistent, each augments the meaning of the other. For example, the relation of the OAP clusters to one another is clearer, and hence their value as a map of occupational differences is improved, by being compared to the

Skills Map. In turn, the relative importance of each of the Skills Map dimensions to job performance is clearer as a result of the comparison.

Criterion 5: Parallel assessment. The classification should be directly linked to a way of assessing whether individuals possess required job competencies.

Establishing a link between people and jobs in the assessment of aptitudes and tasks has been a longstanding but largely unfulfilled goal in industrial psychology. Dunnette (1976) reviewed both job analysis research and the study of human abilities and showed that the task requirements characterizing jobs are very difficult to translate into the terms typically used to assess aptitudes. Fleishman's (1975) work shows the extensive work that is required to specify the component cognitive and motor aptitudes required at different stages of mastering and performing even elemental tasks.

Linkage to GATB scales. The Skills Map has no direct link between people and jobs built into it because the DOT ratings are not explicitly anchored or linked to any particular means of assessing aptitudes. By way of contrast, the OAP groups do have such a direct link because they are stated in terms of scores on the GATB, which is the battery of aptitude tests used in developing the OAP. At least a partial link can be forged, however, between the Skills Map for jobs and ways of assessing people.

Table 7, which compares Skills Map academic levels with OAP clusters, is useful in this regard. Specifically, this table suggests typical GATB cutting scores for the four different academic aptitude levels of the Skills Map. The intelligence scale appears to be a good representation for the academic aptitude dimension of the Skills Map. Minimum scores for the groups appear to be about 110 for the "very high" group, 100 for the "high" group, and perhaps 90 for the "moderate" group. It is not clear what the cutting point for the lowest group might be. The three cutting scores are, respectively, .5 standard deviations above the mean, the mean, and .5 standard deviations below the mean. Translated into IQ scores, they would be, respectively, 92, 100, and 108 (using 100 and 16, respectively, as estimates of the mean and standard deviation of IQ in the general population). These are very rough estimates, of course, because there is variability within the OAP clusters themselves in the minimum level of intelligence required. For example, Appendix F shows that SATB cutting scores for intelligence in Cluster A occupations range from 130 for mathematician (which is 1.5 standard deviations above the mean) to 105 for numerical control tool programmer and osteopathic physician (which is just slightly above the mean). Comparisons with the OAPs do not help in establishing a similar link for the motor or people dimensions of the Skills Map.

Specification of the practical meaning of the DOT scales used in creating the Skills Map. Figures 3-10 were also created to help link job demands to ways of assessing the skills people might possess. Figures 3-6 provide several types of information about the academic competencies dimension of the Skills Map because they provide additional information about the meaning of the components of that dimension. Figure 3 presents the scale for the DOT variable verbal aptitude, which as shown in the figure ranges from a low of 5 to a high of 1. The triangles along this scale mark off the range over which the scores of most of the occupations in each of the four Skills Map academic levels fall. (Specifically the triangles mark off one standard deviation above and below the mean of each group.) Sample occupations for different scale values are also shown. To the far right, illustrations are provided of the job activities and skills that correspond to the integer scale values. To illustrate, operating a switchboard to provide an answering service for clients is an example of an activity of occupations at the moderate academic level (that group generally ranges from 3.5 to 2.9 on the verbal aptitude scale) and stock clerks and barbers are examples of occupations at this level. To the far left of the table are shown percentages of census job titles, and then percentages of workers, that are found at or below various scale values. (The number of workers according to 1970 census category was taken from U.S. Bureau of the Census, 1973, Table 38). For example, approximately 60% of both titles and workers represent job demands at or below scale value 3, which includes both the low and moderate academic groups. This seems consistent with the definition in Appendix A for that scale value: the "middle third of the population" which "possesses a medium degree of the aptitude."

Insert Figures 3 and 4 About Here

Figure 4 provides additional information about the verbal component of the academic aptitude dimension. Although the variable "language development" shown in this figure is not an actual component of the Skills Map dimension, as was verbal aptitude, it is almost as highly correlated with the dimension (.91 vs. -.93, scoring is reversed in one scale accounting for the difference in sign). The illustrations for language development are in terms of academic curricula and so may be of greater practical value. For example, the moderate academic group is required to be able to write somewhere between the level of compound and complex sentences and the level of writing entire reports with proper form and grammar. The cumulative percentages suggest that over half of workers (see scale value 3) have to read, write, or speak so that they can read various rules, instructions, atlases, or magazines, write reports and essays, and speak with poise in correct English.

Before discussing the other figures, it can be noted that the figures provide two ways to link the job demands to the evaluation of an individual's skills: absolute (Does the individual have the skills necessary to perform the work?) and relative (How competitive is the individual compared to other people who might be seeking the same job?). A person might possess all the language skills just cited, and so have the minimum verbal skills demanded in a job at about the 55th percentile in demands for verbal aptitude. But if 75% of the population actually possesses such verbal skills, the individual may be at a disadvantage when competing for the job. To some extent many people applying for the job may be "overqualified" in terms of the minimal skills required, but it may still be wise for an employer to select them because their greater verbal aptitude may in fact make them somewhat better workers. Studies of the validity generalization of cognitive tests suggests that this is the case (Schmidt & Hunter, 1981). It is not clear what proportion of the population is qualified at each absolute level, but there are many academic or intellectual assessments that can provide data on the relative standing of individuals. The unique advantage of the Skills Map (as portrayed in Figures 3-10) is to provide a useful way of ranking occupations in their demands.

Figures 5 and 6 refer to the other component of the Skills Map academic aptitude dimension: numerical or mathematical competence. According to Figure 6 for mathematical development, over half of jobs require the ability to make computations such as ratios, proportions, discounts, interest, or to do simple algebra or geometry. The "very high" level group covers a considerable range of numerical and math skills. One difference between the DOT verbal and numerical aptitude scales appears to be that the definition (in Appendix A) of what is moderate (i.e., scale value 3) does not correspond to what is average in terms of actual job demands, because the latter is lower (i.e., closer to scale value 4). Referring back to the OAP patterns in Table 5 or to the OAP Manual (U.S. Department of Labor, 1980a, Table 9), it appears that the DOT scale used to estimate numerical aptitude should be adjusted somewhat. This would have no effect on the Skills Map, however, because it essentially makes this adjustment (i.e., the means of the Skills Map "moderate" level group are lower on DOT numerical than on verbal ratings).

Insert Figures 5-10 About Here

Figures 7-9 refer to the three components of the Skills Map motor aptitude dimension: motor coordination, finger dexterity, and manual dexterity. All are correlated about -.8 with that dimension. These three figures are interesting because they show that around 90% of both job titles and workers are at or below scale value 3, which means that 90% require no more than a moderate amount of the skill. In fact, most jobs fall in the narrow range between 4 and 3 on the motor scales. This relatively low level and restricted range of motor skill demands according to the DOT ratings is consistent with the OAP patterns discussed earlier. Even where variation in motor skills is related to job performance, the SATBs show that the minimal level needed for satisfactory performance is almost always low.

The final figure applies to the third Skills Map dimension, dealing with people. The DOT worker function shown in Figure 10, "complexity of involvement with people," is the only DOT variable general enough to represent the third Skills Map dimension, but it has limitations. It represents the *difficulty* level at which a worker deals with people rather than *degree* of involvement. Difficulty level and degree of involvement may be much the same, because the variables "dealing with people" (Depl) and the worker function "complexity of involvement with people" are highly correlated (.75). Nevertheless, they are conceptually distinct. Parking attendants and sales clerks are two examples of jobs with high involvement with people but at a relatively low level (serving or exchanging information).

It is clear from the figure that involvement with people comes in many varieties, but most workers have only simple relations, if any at all, with people as part of their jobs. Two-thirds are at or below the difficulty level of exchanging information (speaking-signalling). There is considerable overlap on this scale of the moderate and high dealing-with-people groups, reinforcing the earlier suggestion that the three people groups should be consolidated to two. It would be useful to make further distinctions in the *type* of involvement workers have who *do* deal extensively with people. The complexity of involvement with people variable would be a potential variable for this purpose; of the DOT variables, it is the only option.

It should be noted that this latter variable should generally be used in conjunction with the DOT temperament Depl because no matter how slight the involvement with people among high level jobs, their level of complexity of involvement is high (refer to the percentiles in Appendix E in the previous report). Another limitation of the complexity of involvement with people variable is noted in its documentation: "As each of the relationships to People represents a wide range of complexity, resulting in considerable overlap among occupations, their arrangement is somewhat arbitrary and can be considered a hierarchy in the most general sense" (U.S. Department of Labor, 1977a, p. 1369). The placement of the "diverting" item (scale value 4) seems most questionable.

Criterion 6: Link to demographic data. It should be possible to link the classification of job demands to employment statistics or demographic data about workers.

Both the DOT and the PAQ job ratings were aggregated according to the over 400 1970 detailed census occupational titles before creating the Skills Map. (Appendix C lists those census categories and the Skills Map aptitude groups to which they were assigned.) The advantage of this procedure linking job descriptors to the census classification is that it provides access to the wide range of demographic data on the labor force that is collected by the Census Bureau. The distributions of the number of workers at each aptitude level in Figures 3-10 were available only because the DOT data were arranged by census code, which allowed us to use data published by the Census Bureau on the number of workers employed in each detailed census title. We also used these data to produce Table 1, which showed the number of workers employed in jobs demanding different combinations of academic, motor, and people competencies. Table 1 shows that many combinations of competencies can be found in the U.S. economy, but half of all jobs fall into just a few groups: 4, 13, 15, 21, and 30. The first two account for 27% of all employment, they consist of jobs with low to moderate academic demands, moderate demands for motor aptitudes, and no dealings with people, and they are represented primarily by craftsmen and machine operatives. The other three groups account for 25% of employment, and involve dealing with people but not motor skills, the major difference among them being academic level (moderate vs. high vs. very high). With low academic aptitude or skills, Group 4 is the most likely source of a job. With moderate academic skills, there is more choice because there are as many people as non-people jobs. At the high and very high academic levels, by far most of the jobs involve dealing with people. If one wants to obtain a job where one can exercise high motor aptitude, neither the lowest nor the highest academic level jobs are likely candidates.

By linking the Skills Map to demographic data, it would also be possible to look at the relation between the types of demands jobs make and the types of people (age, race, sex, income, etc.) who fill those jobs and to examine questions about income determination, race and sex differences in employment, labor market segmentation, supply versus demand for different types of labor, and the role of education in preparing people for jobs. We will be using the Skills Map in future research to explore such issues.

In order to link the Skills Map with demographic data collected in 1980, the Map would have to be recreated after aggregating DOT ratings to the 1980 categories. The 1980 census classification is quite different than the one for 1970.

Criterion 7: Multiple levels of analysis. The classification should incorporate several levels of analysis so as to allow several levels of decision making (from broad to narrow) and to allow linkage with other materials developed at various levels of specifity.

The Skills Map is a broad and simplified picture of how jobs differ in their aptitude demands. It was designed to be. For some types of decisions, broad dimensions for distinguishing among jobs are quite useful. The process of vocational choice is a process of narrowing one´s alternatives, and it makes sense in counseling settings to use the Skills Map to narrow them first according to the most general and important requirements and then proceed to examine the more specific skills required. For example, if the major difference among jobs is an academic competence or intelligence factor, then it may be a useful strategy for individuals to focus their attention on jobs that are neither far below nor far above their apparent academic aptitude level. It may even be useful for them to just realize what jobs are and are not available to people with below average, average, or above average academic competencies. Knowing what sorts of jobs are usually available to someone with only a high school degree versus those that are available to a more highly educated person may help people who are uncertain about continuing their educations to decide whether or not it is worthwhile or important for them to continue in school. Also, more specific training is generally required for most jobs, but the types of training that are realistic options often depend upon one´s general aptitudes, whether they be academic, motor, or interpersonal. Likewise, if an individual is very interested in or good at working with their hands or working with people, the Skills Map can give them an overview of their options, including the other general competencies that may be required for them to obtain a job where they can exercise their motor or interpersonal skills.

Appendices C-I were included in the earlier report in order to provide more detailed information about job demands. They show for each of the 400 or so census categories whether the demand for each worker trait is low, moderate, or high. These data were used to provide descriptive profiles of the 36 Skills Map aptitude groups (see Appendix B in the present report) as well as to highlight the variation within the groups along other dimensions of job demands (e.g., need for vigilance, tolerance of stress). As discussed earlier, however, an intermediate level of analysis would also be desirable. "Sub-maps" showing distinctions of secondary importance would be useful, in part because the secondary dimensions are likely to be different for high vs. low-level jobs. As already discussed, the interpersonal skills required probably differ by job level.

Once people have narrowed their options, they need to know more about the skills or training required in the one or few occupations they are serously considering. Likewise, training or selection programs for specific types of jobs should specify the particular aptitudes (and levels of those aptitudes) necessary for entry as well as the particular skills that the job entrant is expected to develop. Such detailed information is beyond the scope of the Skills Map. Any one classification system, particuarly a global one, is going to be limited in the amount of detail it provides. However, a classification becomes more useful to the extent that it can be explicitly linked to other sources of information. Also, if it can be used to organize disparate sources of information and thereby make their relations to the classification and to each other clearer, all the sources of information as well as the classification increase in both practical and theoretical value. The discussion earlier in this report of the similarities and differences between the Skills Map and the U.S. Employment Service´s OAP groups provides a clear example. Linking the occupations in the _Occupational Outlook Handbook_ (U.S. Department of Labor, 1982b) to the

Skills Map would be another. Many studies have been done examining job demands but, as noted earlier, they have typically been limited in the job descriptors, occupations, or job settings analyzed. It would therefore be informative to organize studies of the validity of various predictors of job performance according to the major Skills Map competencies they require, because it might reveal patterns of validity generalization by type of occupation or type of job attribute. As already noted, job classification and validity studies could profit from better theory about job demands. Several other examples illustrate the potential organizational value of a broad classification such as the Skills Map.

The program at the National Center for Research in Vocational Education on occupational adaptability, employability, and transferable skills (e.g., Selz, 1980; Sjogren, 1971; Altman, 1976; Faddis, 1979; McKinlay, 1976; Miguel, 1977; Selz, Jones, & Ashley, 1980) focused on job-related skills general to all jobs. The objective of the Skills Map is not the same; it is to show the differences in what makes a person employable from one occupation to another. Selz (1980, p. 24) provides a list of 39 employability skills that were developed "through a search of literature, an examination of numerous programs to prepare people for work, and the advice and consultation of educators and personnel in business and industry" (pp. 1-2). She classified each under one or more of four headings: "doing what the man wants" (e.g., follow rules and policies, get along with others, use the tools and equipment a job calls for), "getting yours" (e.g., ask for a raise, manage one's own time and activities, know one's rights as an employee), "taking charge" (e.g., figure out a better way to get things done, persuade others to one's way of thinking, interview for different job positions when necessary), and "finding your niche" (e.g., get a job for which one has the training and background, know what kind of work one wants to do, fill out forms as required by law or an employer). Most of the "getting yours" and "finding your niche" items reflect career management and job finding skills and so are outside the scope of the Skills Map. Items in the other two sets are more relevant to the Skills Map, although some are vague in order to be applicable to all jobs (e.g., use the reading, writing, and math skills the job calls for). The items that are more specific (e.g., get along with others) are fairly elemental. Taken together, the set of 39 items can most usefully be conceptualized as skills useful for teenagers looking for work, work which is probably low level and entry level. As such, these skills are only peripherally relevant to most groups in the Skills Map because it deals with the full range of jobs in the economy.

Sjogren´s (1971) report for NCRVE on occupational adaptability reviews the need for clustering occupations according to their similarities in order to develop more efficient and effective vocational curricula and training programs. He also reviews efforts to do so. Although the review a reflects somewhat narrower focus than the concerns underlying the development of the Skills Map (because of the former´s focus on job training programs), the two are consistent because of their common concern with variations in demands from one job to another. Sjogren does not discuss any particular lists of skills that are transferable from some jobs to others, but the studies he cites could probably be usefully organized according to the Skills Map dimensions.

The Generic Skills project of the Canada Department of Manpower and Immigration (e.g., Smith, 1975; Kawula & Smith, 1975; Randhawa, 1978) is another example of an effort to identify skills that are common vs. unique to different occupations for training purposes. The five a priori types of skills that were assessed are similar to the dimensions of the Skills Map: mathematics, communication, and reasoning (all three of which corresond to math, verbal, and reasoning variables highly correlated with the Skills Map academic apttude dimension) and interpersonal and manipulative skills (which correspond, respectively, to the Skills Map people and motor dimensions). Each of these five skill areas is represented by specific items of a curricular nature (e.g., change fractions to decimals or percentages, write single paragraph letters). Comparing these items to the content of the three GED components (see math, language, and reasoning, Appendix A) suggests that the Generic Skills Project items correspond primarily to the two lowest levels on the three GED scales, which in turn correspond to the low and some of the moderate academic aptitude groups in the Skills Map. When the 76 occupations included in the Generic Skills Project are classified according to the Skills Map, most are found at the moderate academic level although some are found at each of the four levels. All levels of motor aptitude and dealing with people are represented. Examples of occupations at each of the academic aptitude levels are: welder and janitor (low), auto mechanic and barber (moderate), bookkeeper and secretary (high), and medical laboratory technician and draftsman (very high). The 76 occupations are not representative of all occupations but instead are occupations which are "generally agreed to be at the vocational levels (trades, aides, technicians, craftsmen, and technologists) and not for those occupations in which people are generally prepared by university degree programs" (p. 2).

The Generic Skills Project analyses of which skills are core to all non-supervisory and to all supervisory occupations versus the skills that are required in only some jobs and not others (e.g., Kawula & Smith, 1975) could be reviewed for their relation to the Skills Map and its appendices. This would help to link the Skills Map to detailed information it does not now incorporate. It is clear from the preceeding comments, however, that any generic skills the Generic Skills Project reveals refer to only a subset of all jobs. Specifically, they apply primarily to jobs requiring moderate levels of academic aptitude.

In summary, little has been done to link the Skills Map to other sources of job information, but it appears to offer a useful organizing scheme for more detailed data. The strength of the Skills Map is its breadth and generality. Its usefulness could be extended with additional (more detailed) levels of analysis. With the exception of the proposed sub-maps, that may best be accomplished by incorporating and reorganizing existing more piecemeal research and information about job demands.

Conclusions

This report reviewed the development of the Skills Map, a comprehensive classification of occupations based on their competency requirements. The bulk of the report was then devoted to assessing that classification according to seven criteria. Although some of the criteria could be applied to any classification, they were posed with the specific goal of producing a scheme useful for assessing the employability of individuals or different groups in the population for different types of work. The Skills Map ranges from poor to excellent across the different criteria.

Criterion 1: Valid job descriptors. There is insufficient information for evaluating the reliability of most DOT items and of the individual PAQ items, although on the whole the available evidence is positive. Because of the greater problems DOT raters seem to experience than do PAQ analysts in producing job ratings, the DOT may suffer from more illusory halo, which is a problem characterizing all job ratings. A comparison of GATB and DOT data suggested where illusory halo may be a particular problem. Despite the problems job ratings have, they are the only practical way to obtain relevant job data for a large set of occupations, and such ratings are superior to data based on the attributes of job incumbents. Aggregating the job ratings for the 12,064 civilian DOT occupations into 396 census categories appears to ameliorate some on the problems of the DOT data, particularly their overrepresentation of manufacturing vs. service occupations. Overall, the data upon which the Skills Map is based are probably of fair to good quality when aggregated.

Criterion 2: Occupational coverage. The DOT data provide excellent coverage of the range and variety of jobs in the U.S. economy. Less than 1% of the workforce is not covered by DOT ratings because of lack of DOT data for their occupations. (About 6% are not covered because of lack of data for determining what occupations they hold.) Thus the Skills Map also provides excellent coverage.

Criterion 3: Aptitude coverage. Most of the DOT scales have the advantage of measuring worker attribute requirements and worker behaviors as opposed to task requirements, the latter being less relevant for assessing the employability of individuals. The PAQ items refer primarily to worker behaviors. The DOT provides good coverage of two of the three general types of competency judged, a priori, to be important: cognitive and motor aptitudes. Although one DOT variable distinguishes between jobs dealing with people and those not, it does not provide a good description of the interpersonal skills required by jobs, the third dimension judged to be important a priori. The PAQ provides more data on interpersonal activities, but primarily for the higher-level jobs. The lack of data on interpersonal skills is the greatest aptitude omission of the Skills Map in its present form. Data from other sources, together with an analysis of the internal problems of the Skills Map itself, were used to suggest improvements. In particular, the importance of personal presentation skills (e.g., attractiveness, persuasiveness) and level of complexity of dealing with people are attributes that could be added to the Map to more usefully distinguish among jobs dealing with people. "Sub-maps" were also suggested so that competencies of secondary importance, but which probably differ according to general level of work, could be specified. Physical strength, organization and planning skills, and particular interpersonal competencies (e.g., persuasiveness vs. deference) are examples of potential secondary dimensions.

Criterion 4: Comprehensible map. The Skills Map was created by an objective and replicable method; it was also designed so that the underlying dimensions of the map, which were used to create the 36 Skills Map groups, would be clear and meaningful to potential users. The resulting groups are heterogeneous along other dimensions of competency and job conditions, which is a result that is to be expected but which decreases the face validity of the map to potential users. The incorporation of "submaps" into the Skills Map is one way to create more homogeneous groups. The USES job classification published in the Guide for Occupational Exploration was reorganized according to the Occupational Aptitude Patterns (OAPs) of the groups and then compared to the Skills Map. The two ways of mapping the aptitude requirements of jobs are consistent in distinguishing the cognitive demands of jobs. The other distinctions the two schemes make differ, however, because the OAPs make intra-occupational comparisons (i.e., of which aptitude is most important for job performance within a job) whereas the DOT ratings as used in the Skills Map make inter-occupational comparisons (i.e., of the relative standing of all occupations on an aptitude dimension, whether the aptitude is important or not in any particular job). Both schemes provide useful maps of the distinctions among jobs, although each is limited in the types of distinctions it draws.

Criterion 5: Parallel assessment. The greatest limitation of the Skills Map is that it provides no direct way to compare the skills people possess with the skills jobs require, a failing also characterizing most assessments of jobs or people. Partial links were created, however, between the Skills Map academic dimension and GATB or IQ scores. In addition, sample occupations and worker tasks and behaviors were used to illustrate the skill levels required in the different Skills Map groups. Additional links are desirable.

Criterion 6: Link to demographic data. A valuable feature of the Skills Map is that it links the assessment of job competency requirements to a wide range of data about employment levels and worker characteristics. Several figures showed, for example, what proportion of jobs in 1970 required workers to perform at specific skill levels.

Criterion 7: Multiple levels of analysis. Another valuable feature of the Skills Map is that it provides a broad, simplified portrait of the competency demands of all jobs in the U.S. This global view is useful for making the broad decisions that typify the earliest stages of vocational decision making. It also helps to organize, interpret, and put into perspective the many studies of jobs which are more limited in the jobs, aptitudes, or job settings they incorporate. Nevertheless, it is useful to be able to move systematically to more detailed levels of analysis for both decision making and theoretical purposes. The Skills Map incorporates a set of appendices which provide more detailed data about the 400 of so detailed census titles as well as about the 36 Skills Map groups, but at least one more intermediate level of analysis would be desirable. The suggested sub-maps could constitute this intermediate level. In addition, it would be useful to show how other sources of data about jobs, such as the Occupational Outlook Handbook, could be used in conjunction with the Skills Map.

Finally, some general comments about strengths and limitations of the Skills Map are in order. Any classification is good for some purposes but not others. The Skills Map was designed to provide information about the employability of people for different kinds of work according to the competencies those jobs require. Clearly, more than job-related competencies are involved in locating, being hired for, being promoted in, and being paid for particular types of work. Educational credentials are important in many jobs, but they are not equivalent to any particular competency even though they are strongly related to academic competence. Tenure and job conditions which are considered compensable (e.g., hazardous work) are important and legitimate determinants of pay. A person's vocational interests, not just their capabilities, may also influence their career development. But competencies do play a part, perhaps particularly in determining who is not suitable for particular jobs, that is, as a knock-out factor. And with the increasing pressure upon employers to show that their job selection procedures are actually related to job demands, information about job competency requirements may become increasingly important as well.

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Table 1

Percentage of Workers Employed in Jobs Requiring Different Levels and Combinations of General Competencies

Academic Aptitude	Motor Aptitude	Dealing with people			Total	
		Low	Moderate	High		
Lo	Lo	2.6	1.8	0.6	5.0	27.9
	Mod	19.1	1.5	0.4	21.0	
	Hi	1.9	--	--	1.9	
Mod	Lo	0.04	2.5	2.1	4.6	31.4
	Mod	8.3	4.3	9.2	21.8	
	Hi	3.3	0.8	0.9	5.0	
Hi	Lo	0.04	0.6	7.0	7.7	17.6
	Mod	2.4	0.4	1.7	4.5	
	Hi	1.1	0.2	4.1	5.4	
Very Hi	Lo	0.3	1.1	9.0	10.4	16.4
	Mod	0.4	1.4	2.6	4.4	
	Hi	0.8	0.2	0.6	1.6	
Total	Lo	3.0	6.0	18.7	27.7	
	Mod	30.2	7.6	13.9	51.7	
	Hi	7.1	1.2	5.6	13.9	
Total	Total	40.3	14.8	38.2	93.3[a]	

[a] Occupations of 6.0% of employed workers were not known; 0.8% held occupations which could not be classified in the skills map.

Table 2

The Distributions of Most DOT Ratings for Two Sets of Job Titles: A 10% Random Sample (N=1,172) of DOT Job Titles[a] and 12,064 DOT Job Titles Aggregated into 396 Census Categories

Variable	Mean		SD		Kurtosis		Skew		Min. and Max.	
	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.
Worker functions [b]										
Data	4.11	3.12	2.09	1.74	-1.40	-1.06	-0.47	0.09	0,6	0,6
People	6.83	6.20	1.85	1.63	1.90	1.95	-1.63	-1.35	0,8	0,8
Things	4.32	4.21	2.31	2.10	-1.27	-1.40	-0.28	-0.07	0,7	.5,7
Training times										
GED	3.00	3.62	1.09	1.08	- .45	- .61	.12	- .27	1,6	1,6
Reasoning	-	3.62	-	1.08	-	- .61	-	.27	-	1,6
Math	-	2.72	-	1.19	-	- .10	-	.73	-	1,6
Language	-	3.06	-	1.27	-	- .80	-	.42	-	1,6
SVP	4.46	5.44	2.06	1.74	-1.26	-1.05	.23	- .27	1,9	1.7,9
Aptitudes [c]										
Intelligence	3.19	2.78	.72	.74	.31	- .31	- .65	- .58	1,4	1,4
Verbal	3.43	2.96	.78	.83	.83	- .63	-1.17	- .57	1,5	1,4.2
Numerical	3.63	3.26	.78	.76	.43	.34	- .49	- .79	1,5	1,5
Spatial	3.47	3.28	.71	.69	.37	.40	- .77	- .72	1,5	1,5
Form perception	3.36	3.22	.67	.57	- .30	.16	- .53	- .64	2,5	1.1,4.3

Table 2 - cont.

Variable	Mean		SD		Kurtosis		Skew		Min. and Max.	
	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.
Clerical perception	3.89	3.52	.79	.73	- .28	- .37	- .36	- .51	2,5	1,5
Motor coordination	3.46	3.42	.56	.44	- .79	.71	- .24	- .54	1,5	2,4.7
Finger dexerity	3.56	3.43	.61	.51	.30	1.17	- .88	- .97	1,5	1.4,4.7
Manual dexerity	3.21	3.28	.53	.47	.72	.52	.32	- .89	1,5	1.5,4.7
Eye-hand-foot coordination	4.67	4.53	.60	.54	2.89	3.39	-1.80	-1.63	1,5	1.5,5
Color discrimination	4.52	4.33	.70	.56	1.85	1.04	-1.42	-1.03	1,5	2,5
Temperaments										
DCP	.18	.24	.38	.32	-	-	-	-	0,1	0,1
FIF	.01	.03	.10	.13	-	-	-	-	0,1	0,1
INFLU	.04	.09	.20	.23	-	-	-	-	0,1	0,1
SJC	.17	.30	.38	.33	-	-	-	-	0,1	0,1
MVC	.39	.47	.49	.36	-	-	-	-	0,1	0,1
DEPL	.23	.38	.42	.39	-	-	-	-	0,1	0,1
REPCON	.46	.26	.50	.32	-	-	-	-	0,1	0,1
PUS	.02	.03	.16	.10	-	-	-	-	0,1	0,.9
STS	.60	.51	.49	.38	-	-	-	-	0,1	0,1
VARCH	.20	.29	.40	.30	-	-	-	-	0,1	0,1
Interests										
Data vs. things	- .57	- .26	.66	.66	.27	-1.00	1.23	.56	-1,1	-1,1

Table 2 - cont.

Variable	Mean		SD		Kurtosis		Skew		Min. and Max.	
	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.	Sample	Aggreg.
Science vs. business	- .12	- .11	.45	.53	1.40	- .05	- .49	.22	-1,1	-1,1
Creative vs. routine	- .47	- .28	.53	.44	-1.25	- .01	.21	.24	-1,1	-1,1
Machines vs. social welfare	.62	.38	.55	.54	.08	.06	-1.05	- .83	-1,1	-1,1
Productive vs. prestige	- .05	- .05	.47	.40	1.50	1.01	- .18	- .18	-1,1	-1,1
Physical demands[d]										
Strength	2.39	2.22	.91	.67	- .15	- .43	.42	.14	1,5	1,4

[a] Data for the 10% sample of job titles are taken from Miller, et al., (1980, p. 174).

[b] High scores for worker functions represent low complexity of involvement.

[c] High scores for aptitudes represent low levels of the aptitudes.

[d] First item is scored 1: second item -1.

[e] Only one of the physical demands is listed here. None of the working conditions is.

Table 3

Correlations Between Aptitudes for Two Samples of Individuals Assessed with the GATB and Correlations Between Ratings of Aptitude Requirements for Two Sets of Job Titles

Correlation between aptitudes on the GATB for two samples of people[a]

	G	V	N	S	P	Q	K	F	M
G-Intelligence		.77	.78	.62	.43	.45	.31	---	---
V-Verbal Aptitude	.84		.50	.34	.27	.38	.25	---	---
N-Numerical Aptitude	.86	.67		.28	.39	.50	.35	---	---
S-Spatial Aptitude	.74	.46	.51		.46	.27	.16	---	---
P-Form Perception	.61	.47	.58	.59		.52	.32	---	---
Q-Clerical Perception	.64	.62	.66	.39	.65		.39	---	---
K-Motor Coordination	.36	.37	.41	.20	.45	.51		---	---
F-Finger Dexterity	.25	.17	.24	.29	.62	.32	.37	---	---
M-Manual Dexterity	.19	.10	.21	.21	.37	.26	.46	.52	---

Correlations between (1) mean GATB scores of people in different occupations and (2) scores one SD below the mean (estimated minimum requirements for the job)[b]

G-Intelligence	(.99)	.93	.97	.91	.80	.76	.65	.38	.41
V-Verbal Aptitude	.91	(.98)	.89	.76	.74	.82	.73	.40	.33
N-Numerical Aptitude	.91	.88	(.99)	.85	.82	.80	.69	.39	.43
S-Spatial Aptitude	.86	.71	.77	(.98)	.79	.63	.52	.37	.45
P-Form Perception	.77	.69	.81	.77	(.98)	.86	.81	.64	.58
Q-Clerical Perception	.72	.81	.82	.60	.82	(.98)	.87	.53	.46
K-Motor Coordination	.46	.49	.56	.37	.67	.69	(.98)	.66	.57
F-Finger Dexterity	.17	.16	.21	.20	.37	.26	.56	(.97)	.63
M-Manual Dexterity	.17	.11	.20	.22	.31	.22	.50	.83	(.96)

Correlations between DOT aptitude ratings for two sets of job titles[c]

G-Intelligence		.82	.73	.51	.40	.61	.09	.19	-.12
V-Verbal Aptitude	.95		.71	.40	.32	.63	.00	.14	-.22
N-Numerical Aptitude	.87	.83		.47	.41	.68	.09	.20	-.08
S-Spatial Aptitude	.47	.36	.53		.60	.21	.31	.36	.27
P-Form Perception	.46	.37	.50	.77		.23	.31	.47	.25
Q-Clerical Perception	.67	.71	.67	.07	.20		.02	.12	-.20
K-Motor Coordination	-.08	-.16	-.08	.37	.44	-.13		.53	.52
F-Finger Dexterity	.15	.06	.17	.43	.65	-.00	.72		.44
M-Manual Dexterity	-.25	-.36	-.19	.41	.43	-.48	.71	.69	

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[a] Source: U.S. Department of Labor, Manual for the USTES General Aptitude Test Battery. Section III: Development. (1970, p. 34). Above the diagonal: 2,649 basic airmen. Below the diagonal: 23,428 employed workers, applicants, apprentices, students, and trainees.

[b] Above the diagonal: correlations among means; below the diagonal: correlations among lower cutting points set at one standard deviation below the mean; in the diagonal: correlations between means and cutting points on the same scale. Correlations calculated from data in the GATB Manual, Section III (Table 9-3).

[c] Above the diagonal: a 10% random sample of all DOT titles (N=1,172; Miller, et al., 1980, p. 178). Below the diagonal: 12,064 DOT titles aggregated to 396 1970 census categories.

Table 4

Factor Loadings[a] of Job-Related Traits on Six Dimensions of Job Competencies Required among Relatively High-Level Jobs (N=290)

Trait	Factors I. Good personal presentation	 II. Well organized and responsible	 III. Physically coordinated	 IV. Well Educated	 V. Creative	 VI. Competitive	$\bar{X}^c$	SD
Be tactful and considerate	.64						2.9	0.7
Be attractive & well groomed	.62					.38	2.4	0.8
Have poise	.59						2.9	0.8
Have integrity	.52						3.5	0.7
Be persuasive & motivating	.44		-.28			.32	3.1	0.8
Represent company well to the public	.43	.26				.37	2.8	1.0
DOT - Dealing with people	.39						0.8	0.3
Be fair & impartial	.35						2.9	0.9
Plan ahead & anticipate problems		.69					3.4	0.7
Coordinate & schedule activities	.36	.58					3.1	0.8
Spot & tackle problems quickly		.55			.26		3.3	0.7
Visualize things before completion		.47			.45		3.1	0.8
Handle several tasks at one time		.44					3.4	0.7
Take initiative & responsibility	.27	.43			.27	.26	3.3	0.7
Think logically & analytically		.39		.34	.30		3.5	0.6
Be good at math		.32					2.5	0.9
Pay attention to details		.31					3.4	0.6
Make decisions quickly		.31					2.9	0.8
Have physical coordination			.86				1.6	0.9
Have manual dexterity			.85				1.7	1.0

Table 4 - cont.

Trait	Factors: I. Good personal presentation	II. Well organized and responsible	III. Physically coordinated	IV. Well Educated	V. Creative	VI. Competitive	X̄	SD
Have physical strength and endurance			.60				1.7	0.9
Have higher degree or credential				.78			2.4	1.1
PRESTIGE				.65			61.8	14.6
Give information by writing reports, memos, etc.			-.28	.50			2.9	1.0
Have attended the right college				.49			1.5	0.8
Get information by reading				.41			3.3	0.8
Have a lot of ideas					.71		2.7	0.8
Think of new approaches to problems					.59		3.1	0.7
Learn quickly					.26		3.2	0.6
Be competitive	.26					.68	2.6	1.0
Have good contacts						.57	2.6	0.9

Table 4 - cont.

Trait	Factors							
	I. Good personal presentation	II. Well organized and responsible	III. Physically coordinated	IV. Well Educated	V. Creative	VI. Competitive	$\bar{X}$	SD
Traits not related to any of the six factors								
Get information by talking with people							3.6	0.5
Give information by talking with people							3.5	0.7
Evaluate, discipline, and praise others							2.9	1.0
Be dedicated and conscientious							3.5	0.6
Cooperate with coworkers							3.0	0.7
Have a good memory							3.0	0.7
Concentrate in distracting or stressful situations							3.1	0.8
Follow orders & support company policies							2.4	0.9
Eigenvalues	7.4	2.6	2.3	1.8	1.3	1.1		

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[a] Only factor loadings greater than .25 are shown. Orthogonal factor analysis with varimax rotation.

[b] See Gottfredson, Finucci, and Childs (1982) for a description of the study from which these results are taken,

[c] Prestige measured on a scale from 0 to 96; dealing with people, 0 to 1; other traits: 1=makes no difference, 2=helps a little, 3=helps a lot, 4=critical.

Table 5

Occupational Aptitude Patterns (OAPs) for the 66 Work Groups for the *Guide for Occupational Exploration* (GOE): Organized into 11 Occupational Clusters According to the Similarity of their OAPs [a]

OAP No.	GOE Code [a]	GOE Group	GATB Scale [b]								
			G	V	N	S	P	Q	K	F	M
Occupations Dealing with Physical Relations											
Cluster A: Researching, designing, and modifying physical systems											
7	02.01	Physical sciences	115	105	110	110					
8	02.02	Life sciences	115	105	110	110					
9	02.03	Medical sciences	115	105	110	110					
52	11.01	Mathematics & statistics	115	100	110	100					
17	05.01	Engineering	115		105	110					
Cluster B: Operating and testing physical systems											
18	05.02	Managerial work: mechanical	105	100	100	95					
19	05.03	Engineering technology	105		100	100					
20	05.04	Air & water vehicle operation	105		100	100					
10	02.04	Laboratory technology	105		100						
11	03.01	Managerial work: plants & animals	100		90						

Table 5 - cont.

OAP No.	GOE Code	GOE Group	G	V	N	S	P	Q	K	F	M
Cluster C: Crafting, assembling, repairing, inspecting, and setting up or operating equipment											
Sub-cluster C-1: Spatial orientation											
22	05.07	Quality control			90	90	85				
30	06.01 (1-2)	Production technology			85	90	85				
6	01.06	Crafts arts				90	85				85
21	05.05	Craft technology				90	85				85
23	05.08	Land & water vehicle operation				85	80				85
26	05.10 (1-4)	Crafts				85	80				85
28	05.11	Equipment operation				85	80				85
31	06.01 (3-6)	Production technology				85	85				85
46	09.02	Barber & beauty services				85	85		90		85
47	09.03	Passenger services				85					85
Sub-cluster C-2: Quick, accurate manipulation											
27	05.10 (5-6)	Crafts					80		85		85
32	06.02	Production work					80		85		85
33	06.03	Quality control					80		85		85
Cluster D: Tending (machines, building, plants, animals) and attending (workers, the public)											
34	06.04	Elemental work: industrial							85	80	80
13	03.03 (3-6)	Animal training & service							85		85
14	03.04	Elemental work: plants & animals							85		80
29	05.12	Elemental work: mechanical							85		80
44	08.03	Vending							85		80
48	09.05	Attendant services							85		80

Table 5 - cont.

OAP No.	GOE Code	GOE Group	G	V	N	S	P	Q	K	F	M
		Dealing with Social and Economic Relations									
Cluster E: Researching, planning, and maintaining societal systems											
55	11.03 (0-1)	Social research	110	100	105						
57	11.04 (1)	Law	110	100	105						
60	11.06	Finance	110	95	105			100			
49	10.01	Social services	105	100	100			95			
59	11.05	Business administration	105	95	100			100			
61	11.07	Services administration	105	95	100			100			
63	11.09	Promotion	105	95	100			100			
Cluster F: Persuading, informing, and helping individuals											
50	10.02	Nursing, therapy, and specialized teaching services	105	100							
42	08.01	Sales technology	100	100	95			100			
53	11.02 (1-2)	Educational & library services	100	100	95			100			
56	11.03 (2-3)	Social research	100	100	95			100			
58	11.04 (2)	Law	100	100	95			100			
62	11.08	Communications	100	100	95			100			
65	11.11	Business management	100	95	95			100			
66	11.12	Contracts & claims	100	95	95			100			
Cluster G: Serving and caring for individuals											
45	09.01	Hospitality services	95								
51	10.03	Child & adult care	95								
16	04.02	Security services	95								
12	03.03 (2)	Animal training & service	95					85			

Table 5 - cont.

OAP No.	GOE Code	GOE Group	G	V	N	S	P	Q	K	F	M
		Maintaining Bureaucratic Order									
Cluster H: Maintaining bureaucratic rules, records, and transactions											
64	11.10	Regulations enforcement	105		95			95			
15	04.01	Safety & law enforcement	100					95			
35	07.01	Administrative detail	100		95			100			
36	07.02	Mathematical detail	95		90			100			
37	07.03	Financial detail	95		90			100			
43	08.02	General sales	95		90			90			
24	05.09	Materials control	95		85			90			
	(1-4)										
Cluster I: Processing information											
38	07.04	Oral communications	95					95			
39	07.05	Records processing	95					95			
54	11.02	Educational & library services	95					95			
	(3)										
Cluster J: Manipulating records											
40	07.06	Clerical machine operation	95					100	95		
41	07.07	Clerical handling						90	85		
25	05.09	Materials control						85	85		
	(5)										
Cluster K: Performing											
Sub-cluster K-1: Verbal arts											
4	01.04	Performing arts: music	100	100				100			
1	01.01	Literary arts	100	100				100			
3	01.03	Performing arts: drama	100	100							

Table 5 - cont.

OAP No.	GOE Code	GOE Group	G	V	N	S	P	Q	K	F	M
Sub-cluster K-2: Spatial arts											
2	01.02	Visual arts	100			100	85				
5	01.05	Performing arts: dance	100			95					

GOE Groups without OAPs

01.07	Elemental arts
01.08	Modeling
03.02	General supervision: Plants and animals
05.06	Systems operation
09.04	Customer services
12.01	Sports
12.02	Physical feats

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[a] Source of data: U.S. Department of Labor, Manual for the USTESGeneral Aptitude Test Battery. Section II: Occupational Aptitude Pattern Structure. Washington, DC: U.S. Government Printing Office, 1979.

[b] G - Intelligence; V - Verbal aptitude; N - Numerical aptitude;
S - Spatial aptitude; P - Form perception: Q - Clerical perception;
K - Motor coordination; F - Finger dexterity; M - Manual dexterity.

Table 6

The Predominant OAP Clusters within each of the Skills Map Aptitude Combinations: Shown Separately by Three Foci of Work

		Dealing with people								
Academic aptitude	Motor aptitude	Lo	Mod	Hi	Lo	Mod	Hi	Lo	Mod	Hi
		PHYSICAL RELATIONS			SOCIAL/ECONOMIC RELATIONS			BUREAUCRATIC RELATIONS		
Lo	Lo	D	D	D						
	Mod	C1,C2,D	C1,D	D			G			
	Hi	C2,D	--	--		--	--		--	--
Mod	Lo							I	H,I	H,I
	Mod	C1	C1	C1		G	G	H,J	H,J	H,I
	Hi	C1	C1	C1				J	I	
Hi	Lo	A			E	F	F,G		H,I	H
	Mod	B	B	B			F	H	H	H
	Hi	B,C1	--			--	F	J	--	H
Very hi	Lo	A	A		E	E	E,F			
	Mod	A	A	A		E	F			
	Hi	A, B	B	A			F			

Note: See Figure 1 for the Skills Map aptitude group numbers and sample occupations for each combination of academic aptitude, motor aptitude, and people involvement levels.

Table 7

Most Predominant Pattern(s) of Aptitudes Required in Three Foci of Work and Four Academic Aptitude Levels

	Focus of Work[b]							
Academic Aptitude[a]	Physical relations			Social/economic relations		Bureaucratic relations		
Low	Clusters:			Cluster G				
	C1	C2	D					
	S1, 2	P1	K1	G2				
	P1	K1	M1					
	M1	M1						
Moderate	Cluster C1			Cluster G		Clusters:		
	S1, 2			G2		H	I	J
						G2, 3	G2	Q2
						N2	Q2	M1
						Q2, 3		
High	Cluster B			Cluster F		Cluster H		
	G3			G3		G2, 3		
	N3			V3		N2		
	(S3)			N2		Q2, 3		
				Q3				
Very High	Cluster A			Clusters:				
				F	E			
	G4			G3	G4			
	V3			V3	V2, 3			
	N4			N2	N3			
	S4			Q3	Q3			

---

[a] These are the four levels on the academic aptitude dimension of the Skills Map.

[b] Data for work foci taken from Figure 2.

G = intelligence, V = verbal aptitude, N = numerical aptitude, S = spatial aptitude, P = form perception, Q = clerical perception, K = motor coordination, F = finger dexterity, M = manual dexterity. 1 = minimal level required, 2 = average, 3 = above average, 4 = high. (The foregoing cutting points refer to the minimum aptitude level required for satisfactory job performance.)

Figure 1

36 Occupational Groups Defined According to Levels of Academic Abilities, Motor Abilities, and Dealings with People Required

Low academic abilities

	Low dealings with people	Moderate dealings with people	High dealings with people
Low motor abilities	1 freight + materials handlers (753) longshoremen + stevedores (760) stock handlers (762) metal heaters (626) chambermaids + maids, exc. private household (901) cleaners + charwomen (902) dishwashers (913) laundresses, private household (983)	2 furniture + wood finishers (443) deliverymen + routemen (705) ushers, recreation + amusement (953) crossing guards + bridge tenders (960) maids + servants, private household (984)	3 Parking attendants (711) busboys (911) attendants, personal service (933) baggage porters + bellhops (934) bootblacks (941) elevator operators (943) childcare workers, private household (980)
Moderate motor abilities	4 weighers (392) bakers (402) bulldozer operators (412) forgemen + hammermen (442) tile setters (560) assemblers (602) graders + sorters, manufacturings (624) drill press operatives (650) welders + flame-cutters (680) farm laborers, wage workers (822)	5 messengers + office boys (333) garage workers + gas station attendants (623) boatmen + canalmen (701) railroad brakemen (712) taxicab drivers + chauffeurs (714) animal caretakers, exc. farm (740) garbage collectors (754) food service workers, exc. private household (916)	6 food counter + fountain workers (914) childcare workers, exc. private household (942)
High motor abilities	7 postal clerks (361) furriers (444) jewelers + watchmakers (453) shoe repairmen (542) meat cutters + butchers, exc. manuf. (631) sewers + stitchers (663) knitters, loopers, + toppers (671)	8 none	9 none

*see appendix C for 71 other titles

Figure 1 - cont.

Moderate Academic Abilities

	Low dealings with people	Moderate dealings with people	High dealings with people
Low motor abilities	10 proofreaders (362)	11 expediters + production controllers (323) library attendants + assistants (330) mail handlers, exc. post office (332) stock clerks + storekeepers (381) not specified clerical workers (395) bartenders (910) cooks, private household (981)	12 actors (175) collectors, bill + account (313) dispatchers + starters, vehicle (315) enumerators + interviewers (320) receptionists (364) boarding + lodging house keepers (940) guards + watchmen (962) *see appendix C for 8 other titles
Moderate motor abilities	13 billing clerks (303) keypunch operators (345) shipping + receiving clerks (374) carpenters (415) compositors + typesetters (422) job + die setters, metal (454) auto mechanics (473) structural metal craftsmen (550) farmers (801) *see appendix C for 29 other titles	14 athletes + kindred workers (180) file clerks (325) mail carriers, post office (331) electric power linemen + cablemen (433) plumbers + pipe fitters (522) power station operators (525) roofers + slaters (534) telephone linemen + splicers (554) dental assistants (921) *see appendix C for 10 other titles	15 podiatrists (71) sales clerks, retail trade (283) telephone operators (385) foremen, nec (441) bus drivers (703) waiters (915) nursing aides, orderlies, attendants (925) *see appendix C for 6 other titles
High motor abilities	16 painters + sculptors (190) typists (391) cabinet makers (413) dental laboratory technicians (426) radio repairmen (485) photoengravers + lithographers (515) sign painters + letterers (543) tool + die makers (561) *see appendix C for 13 other titles	17 stenographers (376) brickmason + stonemason apprentices (411) electricians (430) drywall installers + lathers (615)	18 clerical assistants, social welfare (311) lay midwives (924) barbers (935) hairdressers + cosmotologists (944) personal service apprentices (945)

Figure 1 - cont.

High Academic Abilities

	Low dealings with people	Moderate dealings with people	High dealings with people
Low motor abilities	19 political scientists (92) tool programmers, numerical control (172) authors (181)	20 librarians (32) construction inspectors, public administration (213) inspectors, exc. construction, public administration estimators + investigators, nec(321)	21 farm management advisors (24) foresters + conservationists (25) dieticians (74) social workers (100) elementary school teachers (142) buyers, wholesale + retail trade (205) office managers, nec (220) sales representatives (281,282) policemen + detectives (964) *see appendix C for 21 other titles
Moderate motor abilities	22 chemical technicians (151) surveyors (161) engineering & science technicians, nec (162) bookkeepers (305)	23 industrial engineering technicians (154) air traffic controllers (164) technicians, exc. health, engineering, + science, nec (173) dancers (182) photographers (191) payroll + timekeeping clerks (360)	24 home management advisors (26) health technicians + technologists,nec (85) art drama + music teachers, college (123) adult education teachers, exc.college (141) teachers, exc. college, nec (145) teachers aides,exc. school monitors (382) officers, pilots + pursers; ship (221) cashiers (310) conductors + motormen, urban rail transit (704)
High motor abilities	25 mechanical engineering techcians (155) radio operators (171) bookkeeping + billing machine operators (341) decorators + windowdressers (425) machinists (461) sheetmetal apprentices (536) carpet installers (420) tailors (551) *see appendix C for 7 other titles	26 designers (183) millwrights (502)	27 chiropractors (61) therapy assistants (84) coaches + physical education teachers, college (124) pre and kindergarten teachers (143) bank tellers (301) secretaries, legal (370) secretaries, medical (371) secretaries, nec (372)

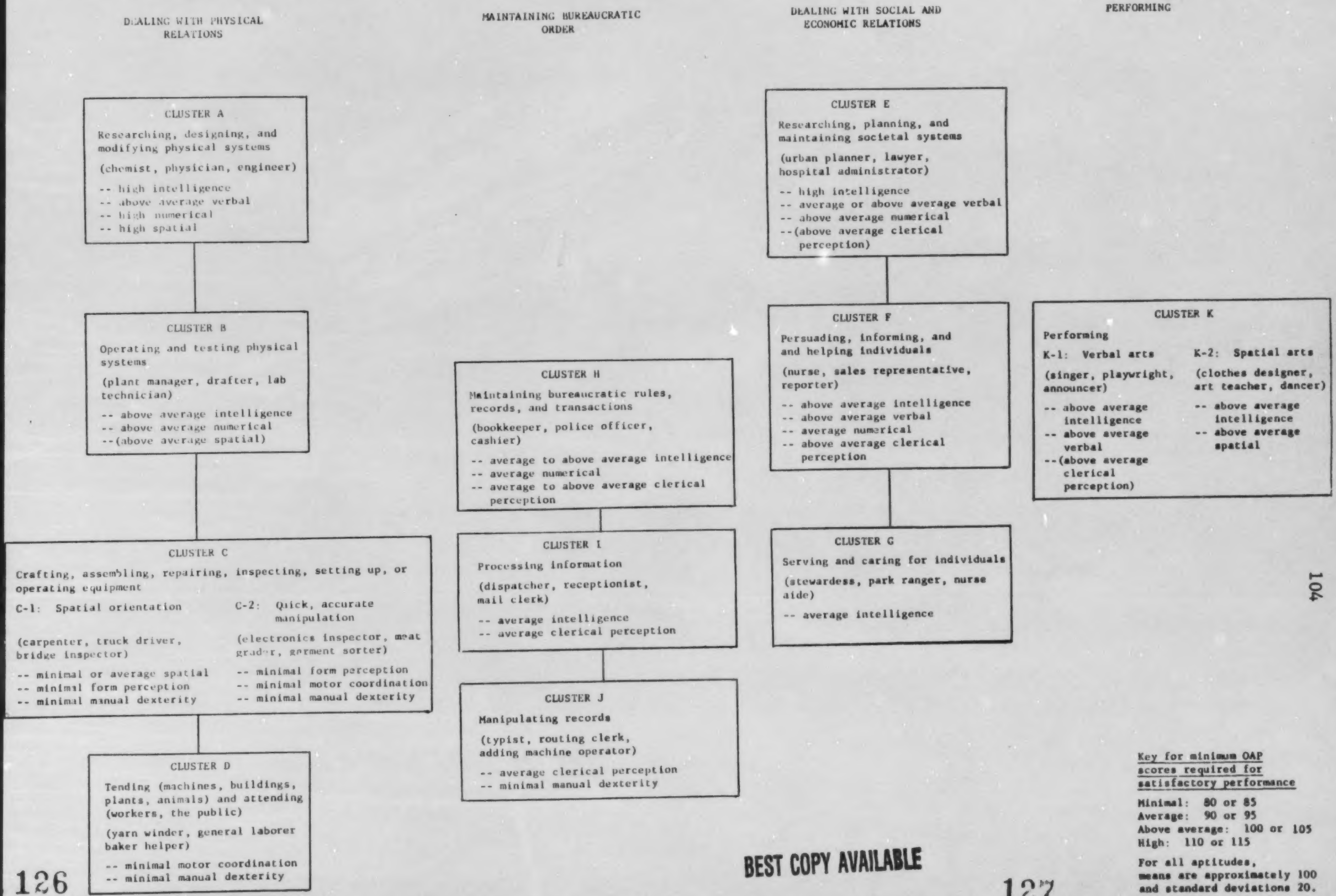
Figure 1 - cont.

Very High Academic Abilities

	Low dealings with people	Moderate dealings with people	High dealings with people
Low motor abilities	28 computer programmers (3) computer specialists, nec (5) actuaries (34) mathematicians (35) statisticians (36) atmospheric + space scientists (43) sociologists (94) social scientists, nec (96)	29 accountants (1) operations + systems research analysts (55) economists (91)	30 judges (30) lawyers (31) personnel + labor relations workers (56) clergymen (86) psychologists (93) teachers, college, subject not specified (140) editors + reporters (184) bank officers + financial managers (202) managers + administrators, nec (245) *see appendix C for 18 other titles
Moderate motor abilities	31 aeronautical + astronautical engineers (6) chemical engineers (10) civil engineers (11) mathematical technicians (156)	32 architects (2) industrial engineers (13) mechanical engineers (14) mining engineers (20) petroleum engineers (21) archivists + curators (33) chemists (45) geologists (51) urban + regional planners (95) *see appendix C for 3 other titles	33 sales engineers (22) registered nurses (75) therapists (76) health specialties teachers, college (113) secondary school teachers (144)
High motor abilities	34 metallurgical + materials engineers (15) agricultural scientists (42) biological scientists (44) marine scientists (52) life + physical scientists, nec (54) pharmacists (64) veterinarians (72) clinical lab technicians and technologists (80) draftsmen (152)	35 health practitioners, nec (73) airplane pilots (163) musicians + composers (185)	36 dentists (62) optometrists (63) physicians (65) dental hygienists (81) radiological technicians + technologists (83)

Figure 2

Job Clusters Based on Similarities among Occupational Aptitude Patterns (OAPs)
(Excluding some supervisory occupations)



DEALING WITH PHYSICAL RELATIONS

CLUSTER A
Researching, designing, and modifying physical systems
(chemist, physician, engineer)
-- high intelligence
-- above average verbal
-- high numerical
-- high spatial

CLUSTER B
Operating and testing physical systems
(plant manager, drafter, lab technician)
-- above average intelligence
-- above average numerical
--(above average spatial)

CLUSTER C
Crafting, assembling, repairing, inspecting, setting up, or operating equipment

C-1: Spatial orientation
(carpenter, truck driver, bridge inspector)
-- minimal or average spatial
-- minimal form perception
-- minimal manual dexterity

C-2: Quick, accurate manipulation
(electronics inspector, meat grader, garment sorter)
-- minimal form perception
-- minimal motor coordination
-- minimal manual dexterity

CLUSTER D
Tending (machines, buildings, plants, animals) and attending (workers, the public)
(yarn winder, general laborer baker helper)
-- minimal motor coordination
-- minimal manual dexterity

MAINTAINING BUREAUCRATIC ORDER

CLUSTER H
Maintaining bureaucratic rules, records, and transactions
(bookkeeper, police officer, cashier)
-- average to above average intelligence
-- average numerical
-- average to above average clerical perception

CLUSTER I
Processing information
(dispatcher, receptionist, mail clerk)
-- average intelligence
-- average clerical perception

CLUSTER J
Manipulating records
(typist, routing clerk, adding machine operator)
-- average clerical perception
-- minimal manual dexterity

DEALING WITH SOCIAL AND ECONOMIC RELATIONS

CLUSTER E
Researching, planning, and maintaining societal systems
(urban planner, lawyer, hospital administrator)
-- high intelligence
-- average or above average verbal
-- above average numerical
--(above average clerical perception)

CLUSTER F
Persuading, informing, and and helping individuals
(nurse, sales representative, reporter)
-- above average intelligence
-- above average verbal
-- average numerical
-- above average clerical perception

CLUSTER G
Serving and caring for individuals
(stewardess, park ranger, nurse aide)
-- average intelligence

PERFORMING

CLUSTER K
Performing

K-1: Verbal arts
(singer, playwright, announcer)
-- above average intelligence
-- above average verbal
--(above average clerical perception)

K-2: Spatial arts
(clothes designer, art teacher, dancer)
-- above average intelligence
-- above average spatial

Key for minimum OAP scores required for satisfactory performance

Minimal: 80 or 85
Average: 90 or 95
Above average: 100 or 105
High: 110 or 115

For all aptitudes, means are approximately 100 and standard deviations 20.

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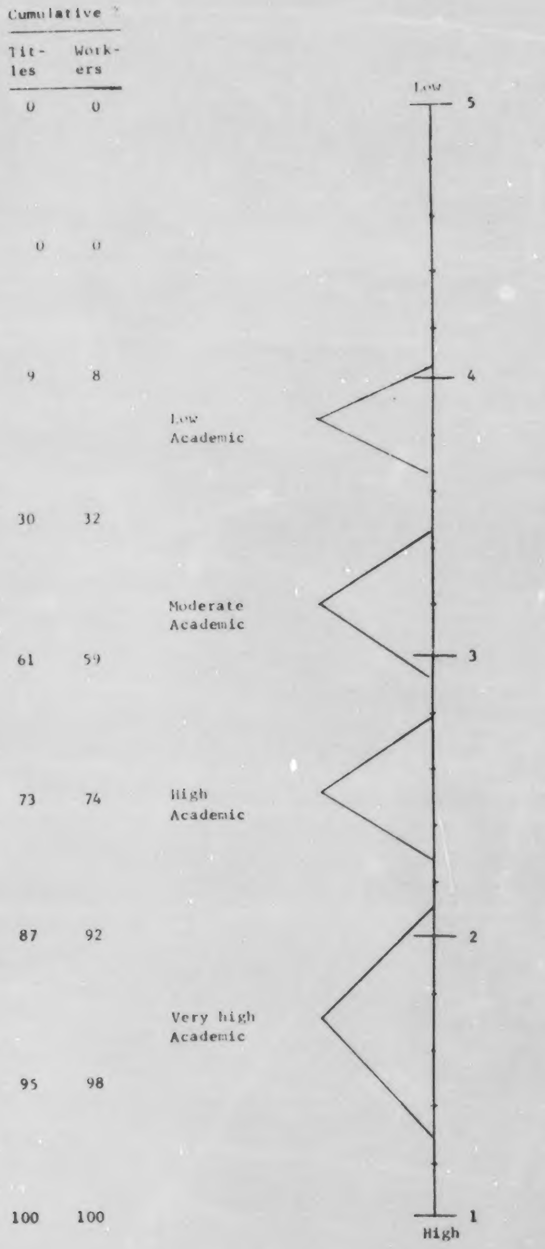
Figure 3

DOT Ratings of Job Requirements: Verbal Aptitude

The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. (Correlated -.93 with the "Academic Competencies" factor in the Skills Map.)

No illustrations.



V-4:3 Tends one or more machines that knit fabrics, garment parts, or other articles from yarn:

Reads knitting ticket for each machine to find out amount to be knitted, style, size, part, dimensions, yarn type, color, and dye lot number; receives any instructions for adjustment of machine to obtain desired quality; records production records for day; and reports any unusual problems encountered.

V-4:11 Drives gasoline or electric-powered fork lift truck to move or stack bulk materials in warehouse or factory:

Must read assignment sheet specifying which vehicle to operate; understand oral instructions from foreman about materials to convey and their specific location and destination. Tells maintenance crew of any irregularities in tractor operation.

V-3:1 Operates switchboard to provide answering service for clients:

Greets caller and announces name and phone number of client; records and delivers messages; furnishes information; accepts orders; and relays calls.

V-3:3 Sets type by hand and machine, and assembles type and cuts in a galley, for printing articles, headings, and other printed matter; determining type size, style, and compositional pattern from work order:

Verbal aptitude is required to understand the meaning of words when proofreading copy and written instructions; and for knowledge of proper spelling, grammar, and punctuation.

V-2:11 Schedules and assigns motor vehicles and drivers for the conveyance of freight according to company and government regulations and policies:

Verbal aptitude is required to read and understand the rules, laws, regulations, and/or policies of the company, union, and Interstate Commerce Comimssion; to effectively communicate instructions to drivers; and to write reports.

V-2:2 Instructs students in one or more subjects such as English, mathematics, or social studies in private, religious, or public secondary school (high school):

Verbal aptitude is required to read and understand textbooks or other literature related to the subject matter taught; to lecture on, discuss, and explain subject matter to convey information to the students; to write lesson plans and outlines; and to read students' papers and write critiques.

V-1:3 Designs chemical plant equipment and devises processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergent, cement, and paper and pulp, applying principles and technology of chemistry, physics, mechanical and electrical engineering, and related areas:

Verbal aptitude is required to acquire the technical vocabulary of chemistry and engineering; in order to read and understand reference materials; and to write technical reports, and design or production specifications.

V-1:5 Directs editorial activities of newspaper and negotiates with production, advertising, and circulation department heads as owner's representative:

Verbal aptitude is necessary to write lead or policy editorials explaining complex political, social, or other issues in language which will be understood by most readers; to interpret the editorial policy of the firm on specific issues to other editorial writers; and to speak at professional and community functions as a representative of the publisher.

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Figure 3 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require verbal aptitude at or below the levels shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs requiring verbal aptitude at or below the specified levels.

Groups that are low, moderate, high, or very high on the general "Academic Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the four groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

Sample occupations at different levels of the scale

The first number in parentheses refers to the Skills Map aptitude group to which the occupation has been assigned; the second number is the occupation's 1970 census code.

Sample activities at each level of the scale

Two illustrations are provided for each of the five levels of the scale used by DOT job analysts. (Occupations in this report may have scores between these integer levels because for this report ratings were averaged for titles grouped under the same census occupational heading). The letters and numbers refer to the numbering of these benchmark illustrations in the DOT Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 4

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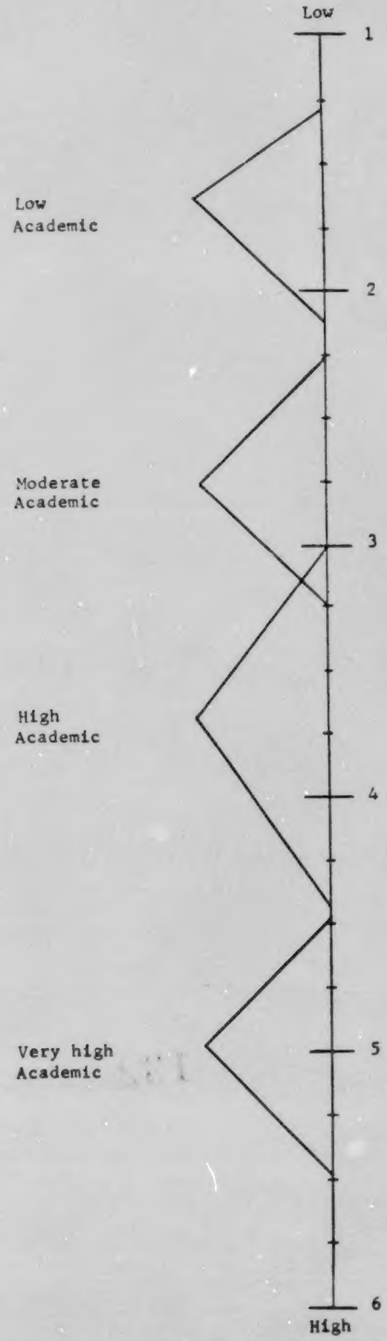
DOT Ratings of Job Requirements: **Language Development**

This is one of three components of General Educational Development (GED) level. GED embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges such as language and mathematical skills. This is education of a general nature which does not have a recognized, fairly specific occupational objective. (Correlated .91 with the "Academic Competencies" factor in the Skills Map.)

Cumulative %	
Titles	Workers
2	1
10	10
27	26
40	37
57	55
68	67
77	80
82	88
94	97
97	99
100	100



Reading:
Recognize meaning of 2,500 (two- or three-syllable) words. Read at rate of 95-120 words per minute.
Compare similarities and differences between words and between series of numbers.
Writing:
Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses.
Speaking:
Speak simple sentences, using normal word order, and present and past tenses.

Reading:
Passive vocabulary of 5,000-6,000 words.
Read at rate of 190-215 words per minute.
Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation.
Read instructions for assembling model cars and airplanes.
Writing:
Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs.
Speaking:
Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, using present, perfect, and future tenses.

Reading:
Read a variety of novels, magazines, atlases, and encyclopedias.
Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work.
Writing:
Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech.
Speaking:
Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.

Reading:
Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias.
Writing:
Prepare business letters, expositions, summaries, and reports, using prescribed format and conforming to all rules of punctuation, grammar, diction, and style.
Speaking:
Participate in panel discussions, dramatizations, and debates.
Speak extemporaneously on a variety of subjects.

Reading:
Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents.
Writing:
Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs.
Speaking:
Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction, phonetics, and discussion and debate.

Figure 4 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require language skills at or below the levels shown opposite on the scale. the second column shows what percentage of all employed workers in 1970 held jobs requiring language skills at or below the specified levels.

Groups that are low, moderate, high, or very high on the general "Academic Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the four groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

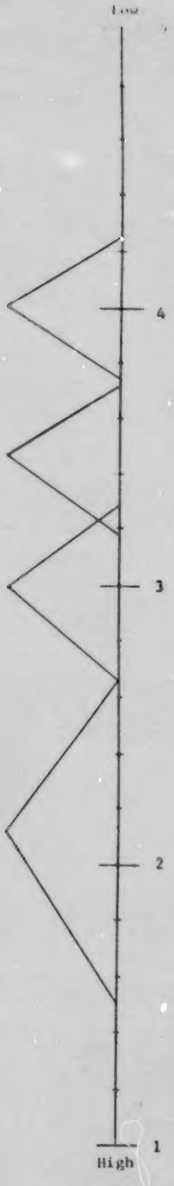
The skill levels represented by the scale values

These are six levels of language skills provided at increasingly higher levels of school curricula (Levels 5 and 6 are the same). Examples of job tasks utilizing these skills are provided in the Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 5

DOT Ratings of Job Requirements: Numerical Aptitude

The ability to perform arithmetic operations quickly and accurately. (Correlated ~.88 with the "Academic Competencies" dimension in the Skills Map.)



Cumulative % Titles	Cumulative % Workers		Rating	
0	0		5	Bootblack (3-941)
2	1			Longshoreman (1-760)
				Clothing ironer (4-611)
21	21	Low Academic	4	Postal clerk (7-361)
				Jeweler (7-453)
44	43	Moderate Academic		
				Plumber (14-522)
75	71	High Academic	3	Buyer (21-205)
				Engineering technician (25-153)
86	86			
				Airplane pilot (35-163)
		Very high Academic		
93	92		2	Pharmacist (34-64)
				Chemist (32-45)
97	96			
				Statistician (28-36)
100	100		1	Actuary (28-5)

No illustrations.

N-4:1 Makes women's garments such as dresses, coats, and suits according to customer specifications and measurements:

Measures customer to determine dimensions of garment; and adds and subtracts to adjust pattern to customer's dimensions.

N-3:1 Sells tickets for transportation agencies such as airlines, bus companies, railroads, and steamship lines:

Computes ticket cost and taxes, using schedules and rate books; checks and weighs baggage; computes travel time and fares for different types of accommodations; prepares daily sales record showing number and class of tickets sold and amount of fare and taxes; and counts and balances cash with sales record.

N-2:1 Applies principle of accounting to install and maintain operation of general accounting system:

Applies numerical reasoning to design or modify systems to provide records of assets, liabilities, and financial transactions; applying arithmetic principles to prepare accounts, records, and reports based on them; auditing contracts, orders, and vouchers; and preparing tax returns and other reports to government agencies.

N-1:11 Appraises real and personal property to determine its fair value and assesses taxes in accordance with prescribed schedules:

Computes the market value of real estate by determining the individual and composite value of such factors as its location, construction, size, age, utility, and marketability at current market prices; and computes amount of tax to levy by determining the individual and total rate of taxes applicable for each taxing jurisdiction with a claim against the property, and applying these to the equalized assessed valuation of the property.

N-4:9 Counts or weighs incoming laundry and sorts by type of article, color, fabric, or wash treatment to be given and enters count or weight on customer's laundry ticket.

N-3:8 Constructs, erects, installs, and repairs structures and fixtures of wood, plywood, and wallboard, using carpenter's hand and power tools:

Measures and computes unspecified dimensions to prepare layouts, mark cutting and assembly lines on materials, shape materials to prescribed measurements, and fit and install window and door frames, trim cabinet work, and hardware.

N-2:11 Repairs electronic equipment such as computers, industrial controls, radar systems, telemetering and missile control systems, following blueprints and manufacturers' specifications, and using handtools and test instruments:

Numerical aptitude is required to calculate dimension; to determine output measurements of components; to compute ratios when calibrating instruments; and to apply principles of geometry and trigonometry to compute angles and coordinates.

N-1:5 Designs industrial machinery and equipment, tools, dies, gages, jigs, fixtures, and machine attachments required for manufacturing industrial products:

Numerical aptitude is required to use analytical geometry, calculus, and differential equations to apply fundamentals of mechanical engineering to machine and tool design.

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Figure 5 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require numerical aptitude at or below the levels shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs requiring numerical aptitude at or below the specified levels.

Groups that are low, moderate, high, or very high on the general "Academic Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the four groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

Sample occupations at different levels of the scale

The first number in parentheses refers to the Skills Map aptitude group to which the occupation has been assigned; the second number is the occupation's 1970 census code.

Sample activities at each level of the scale

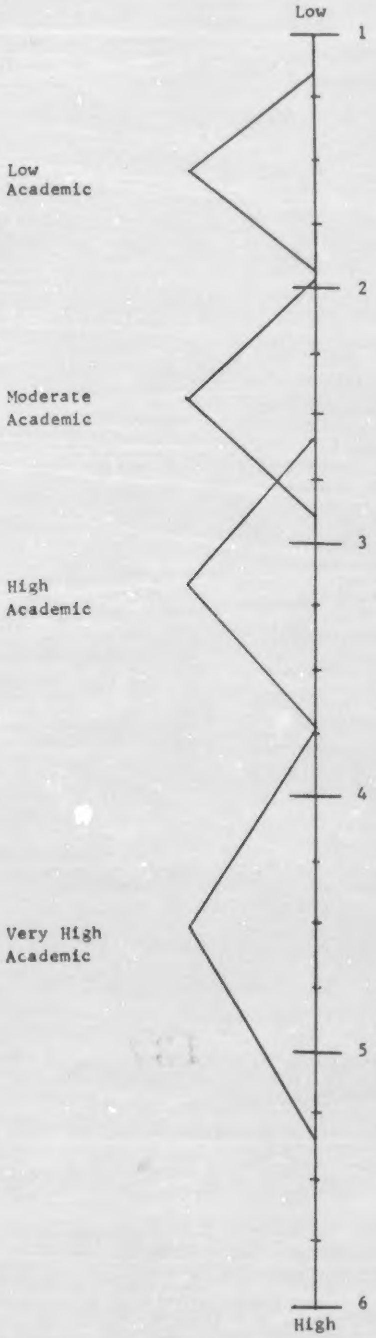
Two illustrations are provided for each of the five levels of the scale used by DOT job analysts. (Occupations in this report may have scores between these integer levels because for this report ratings were averaged for titles grouped under the same census occupational heading). The letters and numbers refer to the numbering of these benchmark illustrations in the DOT Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 6

DOT Ratings of Job Requirements: Mathematical Development

This is one of three components of General Educational Development (GED) level. GED embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges such as language and mathematical skills. This is education of a general nature which does not have a recognized fairly specific occupational objective. (Correlated .88 with the "Academic Competencies" factor in the Skills Map.)

Cumulative %	
Titles	Workers
3	2
17	21
37	37
50	49
68	70
79	84
87	93
90	96
95	98
98	99
100	100



Add and subtract two digit numbers.
Multiply and divide 10's and 100's by 2, 3, 4, 5.
Perform the four basic arithmetic operations with coins as part of a dollar.
Perform operations with units such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.

Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs.
Perform arithmetic operations involving all American monetary units.

Compute discount, interest, profit, and loss; commission, markup, and selling price; ratio and proportion, and percentage. Calculate surfaces, volumes, weights, and measures.

Algebra:
Calculate variables and formulas; monomials and polynomials; ratio and proportion variables; and square roots and radicals.

Geometry:
Calculate plane and solid figures; circumference, area, and volume. Understand kinds of angles, and properties of pairs of angles.

Algebra:
Deal with system of real numbers; linear, quadratic, rational, exponential, logarithmic, angle and circular functions, and inverse functions; related algebraic solution of equations and inequalities; limits and continuity, and probability and statistical inference.

Geometry:
Deductive axiomatic geometry, plane and solid; and rectangular coordinates.

Shop Math:
Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric construction, and essentials of trigonometry.

Algebra:
Work with exponents and logarithms, linear equations, quadratic equations, mathematical induction and binomial theorem, and permutations.

Calculus:
Apply concepts of analytic geometry, differentiations and integration of algebraic functions with applications.

Statistics:
Apply mathematical operations to frequency distributions, reliability and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.

Advanced calculus:
Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems.

Modern algebra:
Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operations methods, and functions of real and complex variables.

Statistics:
Work with mathematical statistics, mathematical probability and applications, experimental design, statistical inference, and econometrics.

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Figure 6 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require math skills at or below the levels shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs requiring math skills at or below the specified levels.

Groups that are low, moderate, high, or very high on the general "Academic Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the four groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

The skill levels represented by the scale values

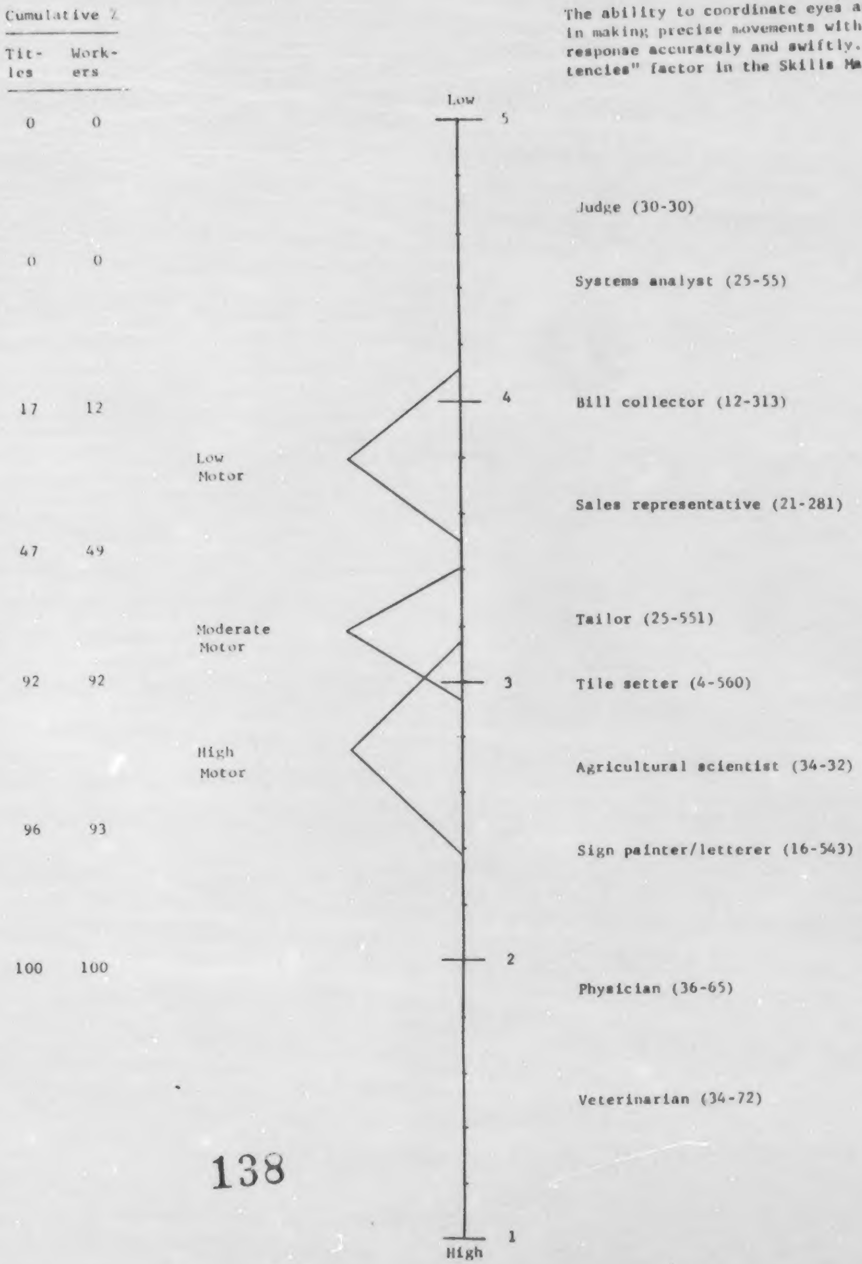
These are six levels of math skills provided at increasingly higher levels of school curricula.

Examples of job tasks utilizing these skills are provided in the Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 7

DOT Ratings of Job Requirements: Motor Coordination

The ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. The ability to make a movement response accurately and swiftly. (Correlated -.82 with the "Motor Competencies" factor in the Skills Map.)



No illustrations.

K-4:1 Performs tasks to finish and press household linens:

Motor coordination is required in placing garments into machine, making sure garments are properly aligned so that no wrinkles will be ironed into garments.

K-3:5 Performs beauty services for patrons of beauty shop:

Coordination of eyes, hands, and fingers is required to cut, style, and tint hair, give facials, arch eyebrows, and manicure nails.

K-2:1 Types letters, reports, stencils, forms, addresses, or other straight copy material from rough draft or corrected copy:

Eye-finger coordination is required to type by "touch", with the fingers striking the appropriate keys as the eyes follow the copy.

K-4:5 Sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines:

Motor coordination is required to align workpiece and cutting tool in relation to one another; to move levers when operating machines; and in using handtools to perform such functions as chipping, filing, and scraping.

K-3:13 Assembles cells and other components in battery case to make complete storage battery:

Eyes and hands must function in constant coordination and at assembly line pace in placing paper liner over battery can with left hand while picking up battery core from a conveyor with right hand; inserting core into battery can, forcing liner under and around core; and placing filled cans onto conveyor.

K-2:3 Diagnoses and treats diseases, injuries, and malformations of the teeth, gums, and related oral structures:

Motor coordination is essential in using drills and other dental tools to extract, fill, or cap teeth; in positioning novacaine needle in gums; and in fitting artificial teeth, plates, and bridges.

No illustrations.

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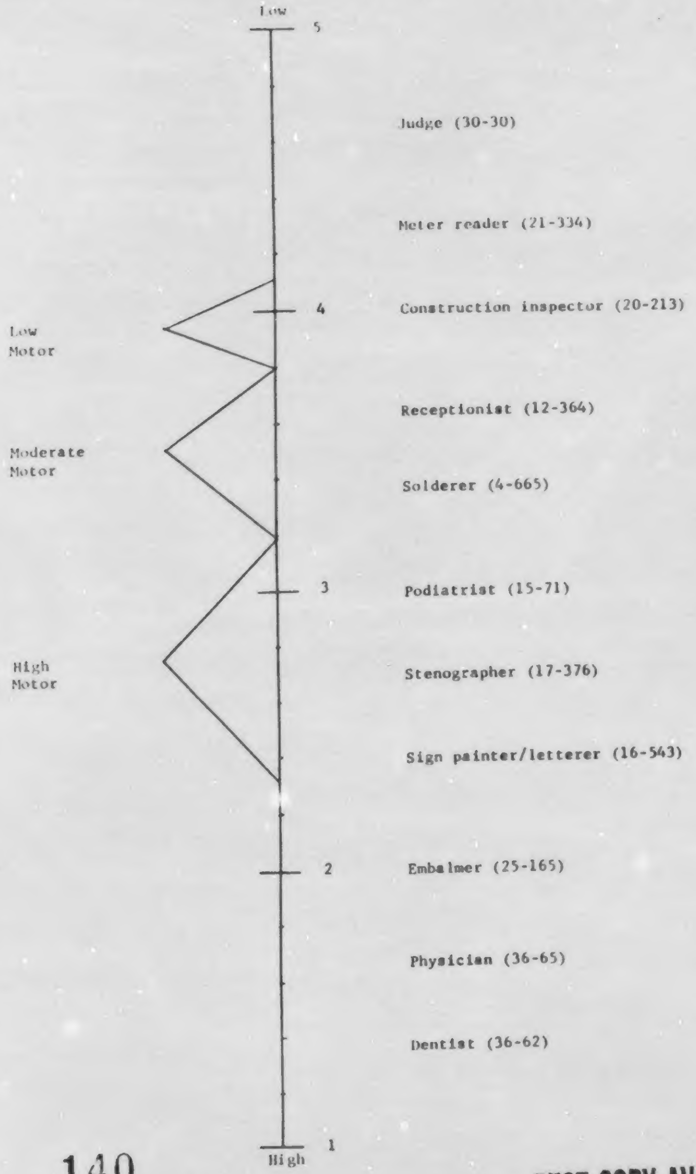
Figure 8

DOT Ratings of Job Requirements: Finger Dexterity

The ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately. (Correlated -.80 with the "Motor Competencies" factor in the Skills Map.)

Cumulative %	
Titles	Workers
0	0
0	0
23	19
55	61
88	88
96	95
99	99
99	99
100	100



No illustrations.

F-1:4 Receives, stores, and issues equipment, material, supplies, merchandise, foodstuff, or tools and compiles records in stockroom, warehouse, or storage yard:

Finger dexterity is required to pick up variety of items carried in stock and to place them in containers and on storage shelves.

F-1:5 Prepares, seasons, and cooks soups, meats, vegetables, desserts, and other foodstuffs for consumption in medical institutions:

Finger dexterity is required in using knives, brushes, scrapers, and other tools to clean, trim, slice, and dice vegetables, fruits, and meats; in portioning foods; in turning dials and valves on kitchen equipment; in removing dishes, napkins, and waste materials from food carts; in sorting and stacking dishes; and in lining pans and shelves with paper.

F-3:1 Feeds tungston filament wire coils into machine that mounts them to stems in electric light bulb:

Finger dexterity is required to grasp coils with tweezers and insert them into slotted plate of mounting machine; and to pick up and examine finished mounts as they emerge from machine.

F-3:2 Plans architectural and structural features of buildings:

Finger dexterity is required in making rough sketches and detail drawings, employing drafting instruments such as protractors, triangles, compasses, rulers, and straight edges.

F-2:2 Adjusts watch movements to comply with mechanical and timing specifications:

Controls placement and movement of watchmaker tools and watch components with fingers in disassembling and cleaning watch movements; in adjusting lock, drop, and slide of escapement; in truing wheel and hairspring assembly; and in reassembling watch movements.

F-2:6 Assembles modules (units) of microelectronic equipment, such as satellite communications devices and hearing aids, using handtools, magnifying lens, and spotwelder:

Finger dexterity is required to insert lead wires of components, such as microdiodes, resistors, capacitors, and microtransistors, into mounting holes of plastic plate; and to attach color-coded wires between specified component leads to make circuit connections.

F-1:1 Plays organ in recital, as accompanist, or as a member of orchestra, band, or other musical group:

All ten fingers must be positioned in rapid integrated movements to depress specified keys at varying tempos on one or more keyboards of an organ.

F-1:2 Performs surgical operations upon human body:

Finger movements of one hand are required to locate broken or cut blood vessel, to position vessel and place ligature about it, and to tie one of several types of knots in ligature to stem flow of blood from vessel.

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Figure 8 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require finger dexterity at or below the levels shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs requiring finger dexterity at or below the specified levels.

Groups that are low, moderate or high on the general "Motor Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the three groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

Sample occupations at different levels of the scale

The first number in parentheses refers to the Skills Map aptitude group to which the occupation has been assigned; the second number is the occupation's 1970 census code.

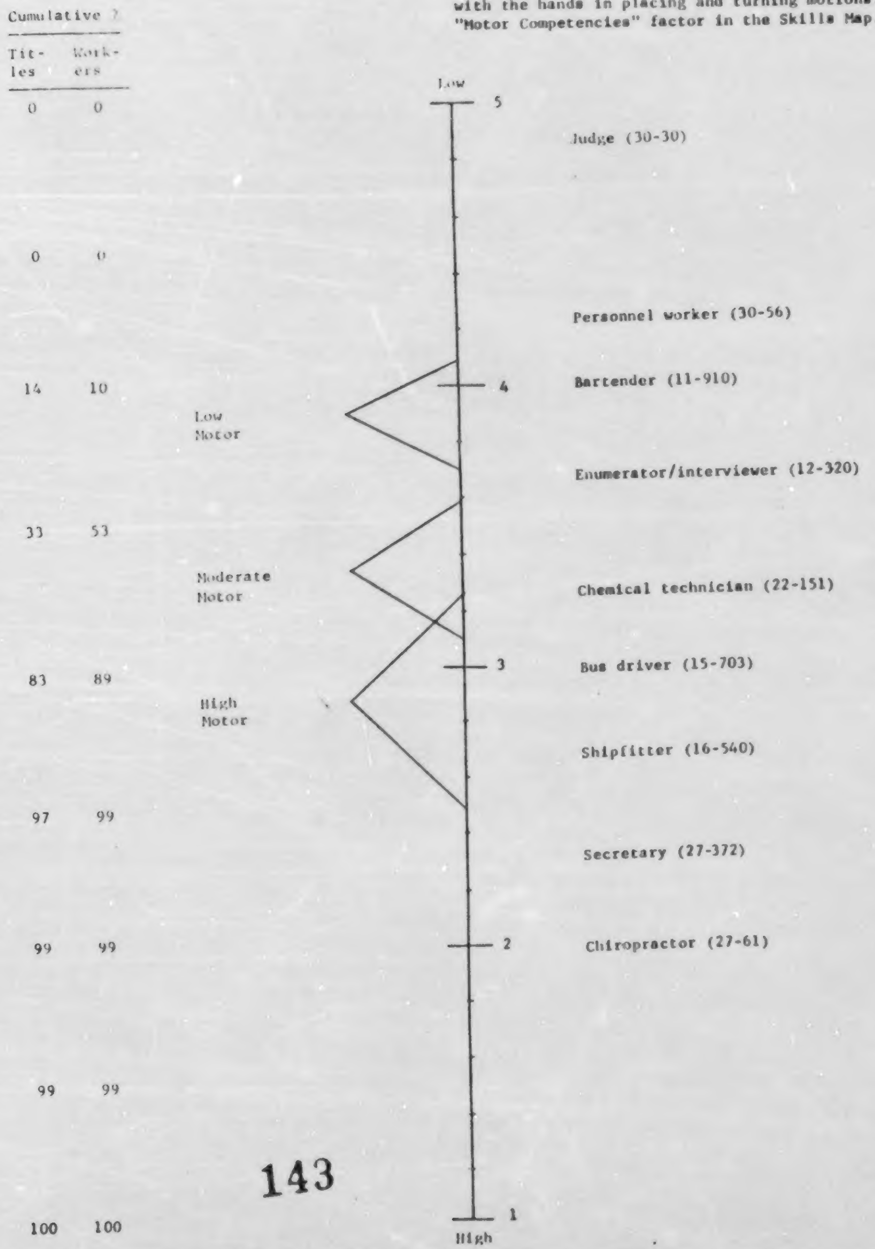
Sample activities at each level of the scale

Two illustrations are provided for each of the five levels of the scale used by DOT job analysts. (Occupations in this report may have scores between these integer levels because for this report ratings were averaged for titles grouped under the same census occupational heading). The letters and numbers refer to the numbering of these benchmark illustrations in the DOT Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 9

DOT Ratings of Job Requirements: Manual Dexterity

The ability to move the hands easily and skillfully. The ability to work with the hands in placing and turning motions. (Correlated -.79 with the "Motor Competencies" factor in the Skills Map.)



No illustrations.

M-4:7 Tends circular knitting machine with automatic pattern controls that knit seamless hose:

Manual dexterity is required to pull hose over hands during operation, separate hose, stack yarns, thread yarn through proper channels when thread breaks; and to clean grease, lint, oil, etc., from machine.

M-4:10 Teaches elementary school pupils academic, social, and manipulative skills:

Manual dexterity is required to prepare outlines, correct tests, record results, and to operate audio-visual teaching aids.

M-3:1 Sets up, inspects, and repairs looms to weave cloth:

A variety of hand and wrist movements are required to adjust screws and levers, install gears, tighten bolts, and to repair and replace various mechanical parts of machine.

M-3:9 Treats patients with disabilities, disorders, and injuries to relieve pain, develop or restore function, and maintain maximum performance, using physical means, such as exercise, massage, heat, water, or light:

Manual dexterity is needed to position, adjust, and operate treatment equipment; to assist patient in transfer activities and ambulation; to position and drape patient for treatment; and to massage and exercise patient's affected part.

M-2:1 Inspects eggs to ascertain quality and fitness for consumption or incubation, according to prescribed standards:

Manual dexterity is required to pick up eggs from cardboard cases; roll and shift eggs within palm while inspecting them; and place acceptable eggs on shuffler rack while working at production line pace.

M-2:11 Covers baked goods with icing or frosting by hand:

Manual dexterity is required in spreading icing over surfaces of baked goods with spatula; in filling and icing layer cakes; in applying glaze or thin icing to sweet rolls; in rolling dough; and in handling trays and other items.

No illustrations.

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Figure 9 -- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require manual dexterity at or below the levels shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs requiring manual dexterity at or below the specified levels.

Groups that are low, moderate, or high on the general "Motor Competencies" factor

The triangles mark off one standard deviation on either side of the mean for each of the three groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

Sample occupations at different levels of the scale

The first number in parentheses refers to the Skills Map aptitude group to which the occupation has been asigned; the second number is the occupation's 1970 census code.

Sample activities at each level of the scale

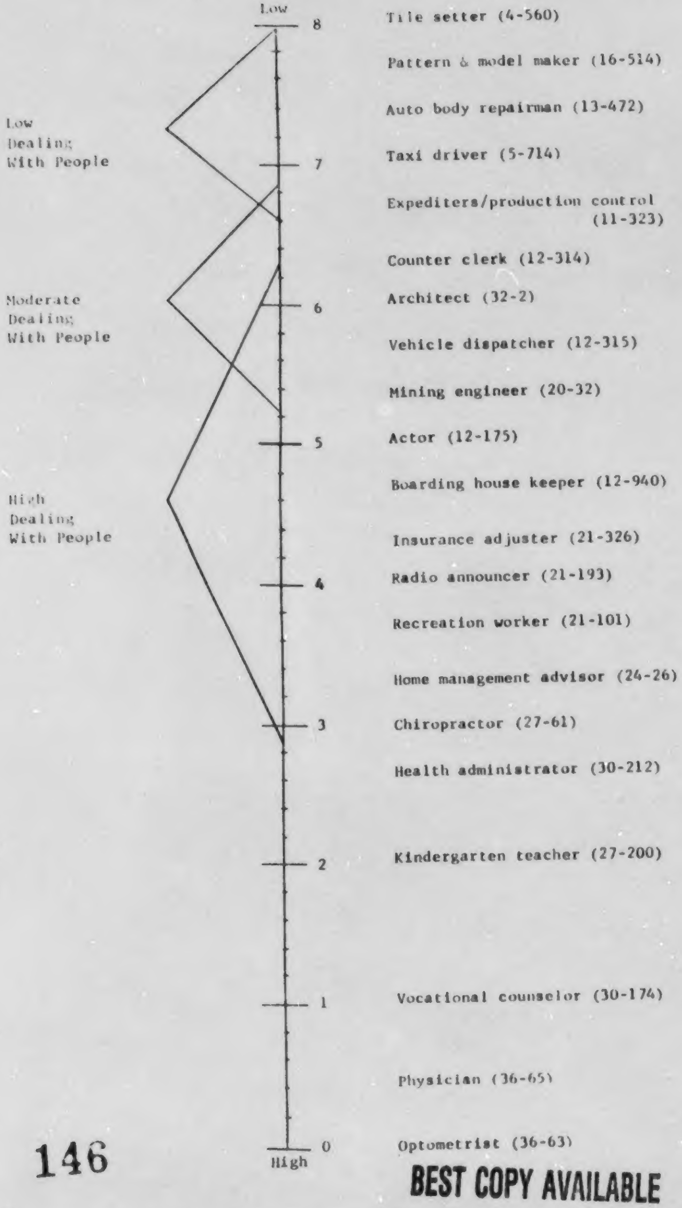
Two illustrations are provided for each of the five levels of the scale used by DOT job analysts. (Occupations in this report may have scores between these integer levels because for this report ratings were averaged for titles grouped under the same census occupational heading). The letters and numbers refer to the numbering of these benchmark illustrations in the DOT Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).

Figure 10

DOT Ratings of Job Requirements: Complexity of Involvement with People

Dealing with human beings, also animals on an individual basis as if they were human. (Correlated -.75 with the "Dealing with People" factor in the Skills Map.)

Cumulative %	
Titles	Workers
8	5
26	25
40	39
51	49
70	64
76	72
83	79
87	87
90	89
92	91
95	95
96	96
98	99
98	99
99	99
99	99
100	100



TAKING INSTRUCTIONS-HELPING: Attending to the work assignment instructions or orders of supervisor. (No immediate response required unless clarification of instructions or orders is needed.) Helping applies to "non-learning" helpers.	Receives instructions. Is informed of assignments, orders, etc. Helps and assists other workers. Obtains directions.
SERVING: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.	Mixes and serves alcoholic and non-alcoholic drinks following standard recipes to patrons of bar. Bathes and gives alcohol rubs to hospital patients.
SPEAKING-SIGNALING: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.	Answers telephone to give information about company's special services to potential customers. Signals or relays signals to operators of hoisting equipment engaged in raising or lowering loads and pumping or conveying materials.
PERSUADING: Influencing others in favor of a product, service, or point of view.	Sells all types of life insurance by pointing out company programs that meet clients' insurance needs. Plans or assists in advertising program to promote sale of company's product. Prepares advertising brochures and manuals for publication.
DIVERTING: Amusing others. (Usually accomplished through the medium of stage, screen, television, or radio.)	Portrays role in dramatic production to entertain audience. Sings classical, opera, church, or folk music in musical programs. Performs classical, modern, or acrobatic dances alone, with partner, or in groups to entertain audience.
SUPERVISING: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them and promoting efficiency.	Trains workers. Evaluates workers' performances against standards. Maintains harmonious relations among workers. Promotes efficiency among workers.
NEGOTIATING: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.	Negotiates with property owners and public officials to secure purchase or lease of land and right-of-way for utility lines, pipe lines, and other construction projects. Confers with foreign shippers to agree upon reciprocal freight handling contract.
INSTRUCTING: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.	Teaches one or more subjects in a college or university classroom. Coaches groups at playgrounds and schools in fundamentals and rules of competitive sports. Demonstrates techniques of a game and drills players in fundamentals until they are familiar with all its phases.
MENTORING: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.	Counsels clients in legal matters. Works out plans with parents, teachers, and children, for overcoming problems in children who have behavioral, personality, or scholastic difficulties.

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Figure 10-- cont'd.

This figure provides the following information from left to right:

Cumulative percentages

The first column shows what percentage of 396 census occupational titles require dealing with people at or below the levels of complexity shown opposite on the scale. The second column shows what percentage of all employed workers in 1970 held jobs that require dealing with people at or below the specified levels of complexity.

Groups that are low, moderate, or high on the general "Dealing with People" factor

The triangles mark off one standard deviation on either side of the mean for each of the three groups; therefore, they indicate the range over which about two thirds of the occupations in each group fall.

Worker functions represented by the scale values

Sample activities for each scale value

Several examples of worker activities at each of the nine levels of the scale are shown. Additional examples are provided in the *Handbook for Analyzing Jobs* (U.S. Department of Labor, 1972).

Appendix A

DOT and PAQ Variables Used in the Skills Map Analyses

Sources of variable descriptions:
    DOT - Miller et al. (1980)
    PAQ job elements - McCormick et al (1969)
    PAQ dimensions - Mecham et al. (1977b)

Page A-23 shows the cutting points on the three Skills Map dimensions that were used to create the 36 Skills Map occupational groups.

Items from DOT (Dictionary of Occupational Titles)

I. Worker Functions

Data — Complexity of function in relation to data. Information, knowledge, and conceptions, related to data, people, or things, obtained by observation, investigation, interpretation, visualization, and mental creation. Data are intangible and include numbers, words, symbols, ideas, concepts, and oral verbalization.

Codes

0 Synthesizing: Integrating analyses of data to discover facts and/or develop knowledge concepts or interpretations.

1 Coordinating: Determining time, place, and sequence of operations or action to be taken on the basis of analysis of data; executing determination and/or reporting on events.

2 Analyzing: Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.

3 Compiling: Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved.

4 Computing: Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Does not include counting.

5 Copying: Transcribing, entering, or posting data.

6 Comparing: Judging the readily observable functional, structural, or compositional characteristics (whether similar to or divergent from obvious standards) of data, people, or things.

People

Complexity of function in relation to people. Human beings; also animals dealth with on an individual basis as if they were human.

Codes

0 Mentoring: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.

1 Negotiating: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.

2 Instructing: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.

3 Supervising: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency. A variety of responsibilities is involved in this function.

4 Diverting: Amusing others. (Usually accomplished through the medium of stage, screen, television, or radio.)

5 Persuading: Influencing others in favor of a product, service, or point of view.

6 Speaking-Signaling: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.

7 Serving: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

8 Taking Instructions-Helping: Helping applies to "non-learning" helpers. No variety of responsibility is involved in this function.

Things — Complexity of function in relation to things. Inanimate objects as distinguished from human beings, substances or materials; machines, tools, equipment and products. A thing is tangible and has shape, form, and other physical characteristics.

Codes

0 Setting up: Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions, change their performance, or restore their proper functioning if they break down. Workers who set up one or a number of machines for other workers or who set up and personally operate a variety of machines are included here.

1 Precision Working: Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

2 Operating-Controlling: Starting, stopping, controlling, and adjusting the progress of machines or equipment. Operating machines involves setting up and adjusting the machine or material(s) as the work progresses. Controlling involves observing gages, dials, etc., and turning valves and other devices to regulate factors such as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials.

3 Driving-Operating: Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered, or which must be guided, in order to fabricate, process, and/or move things or people. Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace charging machines, paving machines and hoisting machines. Excludes manually powered machines, such as handtrucks and dollies, and power assisted machines, such as electric wheelbarrows and handtrucks.

4 Manipulating: Using body members, tools, or special devices to work, move, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and selecting appropriate tool, object, or material, although this is readily manifest.

5 Tending: Starting, stopping, and observing the functioning of machines and equipment. Involves adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages. Turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments.

6 Feeding-Offbearing: Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

7 Handling: Using body members, handtools, and/or special devices to work, move or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

II. Training Times

GED	General educational development This variable was created by taking the highest value of the following three variables: ReasonDT , MathDOT , Lang.
ReasonDT	Reasoning Development

Level

6 Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.

5 Apply principles of logical or scientific thinking to define problems, collect data, establishments, and draw valid conclusions. Interpret an extensive variety of technical instructions in mathematical or diagrammatic form. Deal with several abstract and concrete variables.

4 Apply principles of rational systems to solve practical problems and deal with a variety of concrete variables in situations where only limited standardization exists. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form.

3 Apply commonsense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables in or from standardized situations.

2 Apply commonsense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables in or from standardized situations.

1 Apply commonsense understanding to carry out simple one- or two-step instructions. Deal with standardized situations with occasional or no variables in or from these situations encountered on the job.

Math DOT Mathematical development

Level

6 Advanced calculus:
Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems.
Modern algebra:
Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operations methods, and functions of real and complex variables.
Statistics:
Work with mathematical statistics, mathematical probability and applications, experimental design, statistical inference, and econometrics.

5 Algebra:
Work with exponents and logarithms, linear equations, quadratic equations, mathematical induction and binomial theorem, and permutations.
Calculus:
Apply concepts of analytic geometry, differentiations and integration of algebraic functions with applications.
Statistics:
Apply mathematical operations to frequency distributions, reliability and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.

4 Algebra:
Deal with system of real numbers; linear, quadratic, rational, exponential, logarithmic, angle and circular functions, and inverse functions; related algebraic solution of equations and probability and statistical inference.
Geometry:
Deductive axiomatic geometry, plane and solid; and rectangular coordinates.
Shop Math:
Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric construction, and essentials of trigonometry.

3 Compute discount, interest, profit, and loss; commission, markup, and selling price; ratio and proportion, and percentage. Calculate surfaces, volumes, weights, and measures.
Algebra:
Calculate variables and formulas; monomials and polynomials; ratio and proportion variables; and square roots and radicals.
Geometry:
Calculate plane and solid figures; circumference, area, and volume. Understand kinds of angles, and properties of pairs of angles.

2 Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units.

1 Add and subtract two digit numbers.
Multiply and divide 10's and 100's by 2, 3, 4, 5.
— Perform the four basic arithmetic operations with coins as part of a dollar.
Perform operations with units such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.

Lang Language development

Level

6 Reading:
Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents.
Writing:
Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs.
Speaking:
Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction, phonetics and discussion and debate.

5 Same as Level 6.

4 Reading:
Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias.
Writing:
Prepare business letters, expositions, summaries, and reports, using prescribed format and conforming to all rules of punctuation, grammar, diction, and style.
Speaking:
Participate in panel discussions, dramatizations, and debates. Speak extemporaneously on a variety of subjects.

3 Reading:
Read a variety of novels, magazines, atlases, and encyclopedias. Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work.
Writing:
Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech.
Speaking:
Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.

2 Reading:
Passive vocabulary of 5,000-6,000 words.
Read at rate of 190-215 words per minute.
Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation.
Read instructions for assembling model cars and airplanes.
Writing:
Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs.
Speaking:
Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, using present, perfect, and future tenses.

1 Reading:

- Recognize meaning of 2,500 (two- or three-syllable) words.
- Read at rate of 95-120 words per minute.
- Compare similarities and differences between words and between series of numbers.

Writing:

- Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses.

Speaking:

- Speak simple sentences, using normal word order, and present and past tenses.

SVP Specific vocational preparation

Level	Time
1	Short demonstration only
2	Anything beyond short demonstration up to and including 30 days
3	Over 30 days up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

III. Aptitudes

Note: These scales have been reversed for purposes of this study. In DOT publications, a high score means a low level.

Quintiles for Rating Aptitudes

5 The top 10 percent of the population. This segment of the population possesses an extremely high degree of the aptitude.

4 The highest third exclusive of the top 10 percent of the population. This segment of the population possesses an above average of high degree of the aptitude.

3 The middle third of the population. This segment of the population possesses a medium degree of the aptitude, ranging from slightly below to slightly above average.

2 The lowest third exclusive of the bottom 10 percent of the population. This segment of the population possesses a below average or low degree of the aptitude.

1 The lowest 10 percent of the population. This segment of the population possesses a negligible degree of the aptitude.

Intel	Intelligence: General learning ability. The ability to "catch on" or understand instructions and underlying principles. Ability to reason and make judgments. Closely related to doing well in school. Note: Level 1 is not assigned on this aptitude because it is assumed that every job requires at least a "2."
VerbalDT	Verbal: Ability to understand meanings of words and ideas associated with them, and to use them effectively. To comprehend language, to understand relationships between words, and to understand meanings of whole sentences and paragraphs. To present information or ideas clearly.
Num	Numerical: Ability to perform arithmetic operations quickly and accurately.
Spatial	Spatial: Ability to comprehend forms in space and understand relationships of plane and solid objects. May be used in such tasks as blueprint reading and in solving geometry problems. Frequently described as the ability to "visualize" objects of two or three dimensions, or to think visually of geometric forms.
Formper	Form Perception: Ability to perceive pertinent detail in objects or in pictorial or graphic material; to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.
Clerical	Clerical Perception: Ability to perceive pertinent detail in verbal or tabular material. To observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation.

Motorcor	Motor Coordination: Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and quickly.
Findex	Finger Dexterity: Ability to move the fingers and manipulate small objects with the fingers rapidly or accurately.
Mandex	Manual Dexterity: Ability to move the hands easily and skillfully. To work with the hands in placing and turning motions.
Iftcoor	Eye-Hand-Foot Coordination: Ability to move the hand and foot coordinately with each other in accordance with visual stimuli.
Colordis	Color Discrimination: Ability to perceive or recognize similarities or differences in colors, or in shades or other values of the same color; to identify a particular color, or to recognize harmonious or contrasting color combinations, or to match colors accurately.

IV. Temperaments: Different types of occupational situations to which workers must adjust.

0 not required
1 required

DCP	Direction, control, and planning
FIF	Feelings, ideas, or facts
Influ	Influencing people
SJC	Sensory or judgmental criteria
MVC	Measurable or verifiable criteria
Depl	Dealing with people
Repcon	Repetitive or continuous processes
PUS	Performing under stress
STS	Set limits, tolerances, or standards
Varch	Variety and change

V. Interests: Preferences for certain types of work activities or experiences, with accompanying rejection of contrary types of activities or experiences. Five pairs of interest factors are provided so that a positive preference for one factor of a pair also implies rejection of the other factor of that pair.

Idata

Communication of data versus activities with things

Codes

-1 Situations involving a preference for activities dealing with things and objects.

vs.

1 Situations involving a preference for activities concerned with people and the communication of ideas.

Iscience

Scientific and technical activities versus business contact

Codes

-1 Situations involving a preference for activities involving business contact with people.

vs.

1 Situations involving a preference for activities of a scientific and technical nature.

Icreate

Abstract and creative versus routine, concrete activities

Codes

-1 Situations involving a preference for activities of a routine, concrete, organized nature.

vs.

1 Situations involving a preference for activities of an abstract and creative nature.

Imach

Activities involving processes, machines, or techniques versus social welfare

Codes

-1 Situations involving a preference for working for people for their presumed good, as in the social welfare sense, or for dealing with people and language in social situations.

vs.

1 Situations involving a preference for activities that are nonsocial in nature, and are carried on in relation to processes, machines, and techniques.

Iproduct Activities resulting in tangible, productive satisfaction versus prestige, esteem

Codes

-1 Situations involving a preference for activities resulting in tangible, productive satisfaction.

vs.

1 Situations involving a preference for activities resulting in prestige or the esteem of others.

VI. Physical Demands: Those physical activities required of a worker in a job.

Strength Lifting, carrying, pulling, pushing

Codes

1 Sedentary Work

Lifting 10 lbs. maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

2 Light Work

Lifting 20 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 10 lbs. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree, or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

3 Medium Work

Lifting 50 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 25 lbs.

4 Heavy Work

Lifting 100 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 50 lbs.

5 Very Heavy Work

Lifting objects in excess of 100 lbs. with frequent lifting and/or carrying of objects weighing 50 lbs. or more.

0 not required
1 required

Climbing	Climbing and/or balancing
Stooping	Stooping, kneeling, crouching, and/or crawling
Reaching	Reaching, handling, fingering, and/or feeling
Talking	Talking and/or hearing
Seeing	Seeing

VII. Working Conditions: The physical surroundings of a worker in a specific job.

Location	Outside working conditions

Codes

1 Inside
2 Both inside and outside
3 Outside

0 - not present
1 - present

Cold	Extreme cold
Heat	Extreme heat
Wet	Wet, humid
Noise	Noise, vibration
Hazards	Hazardous conditions
Atcon	Fumes, odors, dust, gases, poor ventilation

Items from the PAQ (Position Analysis Questionnaire)

Variable Name	PAQ Item Number	Item description	Type of rating
1. Information input			
Written	1	Use of written materials	Extent of use
Quant	2	Use of quantitative materials	Extent of use
Pictoral	3	Use of pictorial materials	Extent of use
Patterns	4	Use of patterns/related devices	Extent of use
Behavior	12	Observation of behavior	Extent of use
Events	13	Observation of events or circumstances	Extent of use
VerbalPQ	15	Use of verbal (sic, oral) sources	Extent of use
2. Mental processes			
Decide	36	Decision making	Level of
ReasonPQ	37	Reasoning in problem solving	Level of
Plan	38	Amount of planning/Scheduling	Amount of
Combine	39	Combining information	Importance
Analyze	40	Analyzing information or data	Importance
Compile	41	Compiling	Importance
Code	42	Coding/decoding	Importance
Transcrb	43	Transcribing	Importance
Memory	45	Short-term memory	Importance
Educatn	46	Education	Level of curriculum
Expernce	47	Job-related experience	Months/years
Training	48	Training	Months/years
MathPAQ	49	Using mathematics	Level of
3. Work output			
Exertion	87	Level of physical exertion	Level of
4. Relationships with other persons			
Advise	99	Advising	Importance
Negotiat	100	Negotiating	Importance
Persuade	101	Persuading	Importance
Instruct	102	Instructing	Importance
Pubspeak	106	Public speaking	Importance
Write	107	Writing	Importance
Entertn	110	Entertaining	Importance
Cater	111	Serving/catering	Importance
Reqcont	112	Job-required personal contact	Extent of
Supervis	131	Supervises nonemployees	Importance
Coordin	132	Coordinates activities (no line authority)	Importance
Staffunc	133	Staff functions	Importance
Recsuper	134	Supervision received	Level of

Variable Name	PAQ Item Number	Item Description	Type of rating
5. Job context			
Civicob	148	Civic obligations	Importance
Frust	149	Frustrating situations	Importance
Strained	150	Strained personal contacts	Importance
Sacrifc	151	Personal sacrifice	Importance
Conflict	152	Interpersonal conflict situations	Importance
Soccont	153	Non-job-required social contact	Opportunity for
6. Other job characteristics			
License	160	Licensing/certification required	No/Yes
Workpace	169	Specified work pace	Importance
Repetit	170	Repetitive activities	Importance
Cycled	171	Cycled work activities	Importance
Setproc	172	Following set procedures	Importance
Timepres	173	Time pressure of situation	Importance
Precise	174	Precision	Importance
Detail	175	Attention to detail	Importance
Recognit	176	Recognition	Importance
Viginfre	177	Vigilance: infrequent events	Importance
Vigchang	178	Vigilance: continually changing events	Importance
Distract	179	Working under distractions	Importance
Update	180	Updating job knowledge	Importance
Respsaf	183	Responsibility for safety of others	Degree of
Respmat	184	Responsibility for material assets	Degree of
Respgen	185	General responsibility	Degree of
Structur	186	Job structure	Amount of
Critical	187	Criticality of position	Degree of

Factors Used from PAQ (Position Analysis Questionnaire)

Dim 9 Using machines/tools/equipment

This dimension is dominated by activities involving the use of any of various types of machines, tools, equipment, devices, etc., many of which require the use of control mechanisms.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
62	Activation controls	.73
64	Variable setting controls	.70
63	Fixed setting controls	.70
61	Machines/equipment	.69

Dim 10 Performing activities requiring general body movements

This dimension relates to the degree to which workers perform activities requiring general body movements. The movements primarily include those activities in which the entire body is involved, such as climbing, balancing, standing, and walking, but also, to a lesser degree, those activities emphasising the use of major parts of the body (i.e. arms, legs, etc.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
92	Kneeling/stooping	.66
89	Standing	.63
90	Walking/running	.60
87	Level of physical exertion	.58

Dim 11 Controlling machines/processes

This dimension primarily involves activities relating to the control of machines, processes, and related operations. The control frequently is executed by the use of various control mechanisms, or by direct physical control of some mechanism or device.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
69	Foot-operated controls continuous	.89
67	Foot-operated controls frequent	.85
68	Hand-operated controls continuous	.81
71	Powered highway/rail vehicles	.74

Dim 12 Performing skilled/technical activities

This dimension is characterized primarily by job activities of a skilled or technical nature, some of which may involve the use of control mechanisms, devices, and related equipment.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
59	Technical and related devises	.75
56	Drawing and related devices	.57
58	Measuring devices	.50
50	Precision tools/instruments	.47

Dim 13 Performing controlled manual/related activities

This dimension is dominated by the execution of controlled manual activities of various types. The activities may involve the use of tools, equipment, or other devices, or direct use of the hands as in assembling or adjusting tasks.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
55	Nonprecision tools/instruments	.74
54	Precision tools/instruments	.70
51	Nonprecision tools/instruments	.63
81	Assembling/disassembling	.60

Dim 14 Using miscellaneous equipment/devices

This dimension embraces the use of any of a variety of different types of equipment, devices, and facilities, including those involved in the operation of various types of vehicles. The activities embraced by this dimension frequently involve general body activities and manual functions.

The Four Job elements correlating most highly with Dimension		Correlation
73	Powered water vehicles	.72
74	Air/space vehicles	.66
70	Man-powered vehicles	.48
77	Remote-controlled equipment	.47

Dim 15 Performing handling/related manual activities

This dimension is characterized primarily by job activities which involve the handling or movement of materials with the hands and arms, or which involve the manipulation of things with the hands. It includes handling, positioning, and moving functions in which the hands and arms are dominant.

The four Job Elements Correlating most highly with Dimension		Correlation
82	Arranging/positioning	.68
84	Physical handling	.56
83	Feeding/off-bearing	.55
79	Manually modifying	.50

Dim 16 General Physical Coordination

The primary activities involved in this dimension are those in which the body and body members are used in some coordinated fashion. This may involve the use of various types of mechanical devices, or the execution of coordination activities in the absence of physical equipment or machines or tools.

The four job elements correlating most highly with dimension		Correlation
97	Limb movement without visual control	.73
93	Finger manipulation	.67
98	Hand-ear coordination	.58
65	Keyboard devices	.54

Dim 19 Performing supervisory/coordination/related activities

This dimension represents a variety of communication activities such as those involved in supervisory, coordination, and related functions. In some instances it may involve the instruction or advising of others.

The Four Job Elements Correlating Most Highly with Dimension		Correlation
130	Total number of personnel for whom responsible	.84
128	Supervision of nonsupervisory personnel	.78
129	Direction of supervisory personnel	.73
102	Instructing	.37

Dim 21 Public/related personal contacts

This dimension involves personal contacts with the public or other persons typically outside the organization, such as in selling, dealing with special interest groups, clients, customers, patients, counselees, etc. Although this dimension is concerned primarily with personal contacts with individuals outside the organization, it also may involve communications with some individuals within the organization.

The Four Job Elements correlating most highly with Dimension		Correlation
122	Public customers	.71
120	Sales personnel	.71
121	Buyers	.70
126	Special interest groups	.34

The Levels of Academic, Psychomotor, and People Aptitudes Used to Define Major Groups of Occupations

Levels of the Major Dimensions	Range of Scores	% of Occupations
Academic aptitudes (Num + VerbalDT)		
Low	3.00 - 4.77	30%
Moderate	4.78 - 5.99	30%
High	6.00 - 7.00	20%
Very High	7.01 - 10.00	20%
Psychomotor aptitudes (Findex + Mandex + Motorcor)		
Low	4.00 - 7.00	30%
Moderate	7.01 - 8.99	50%
High	9.00 - 12.00	20%
Dealing with people (Depl)		
Low	.00 - 0.20	50%
Moderate	0.21 - 0.66	20%
High	0.67 - 1.00	30%

Appendix B

Descriptions of the 36 Skills Map Aptitude Groups

Pages B-12 to B-78 of this appendix are taken from the earlier Skills Map report (Gottfredson, 1981, pp. 42-92). The appendices (C-I) to which these descriptions refer are described earlier in the present report; they provide detailed data on each of the census occupational categories as well as the 36 Skills Map groups.

Pages B-2 to B-11 of this appendix list the variables included under each general heading in these earlier Appendices C-H, together with the correlations of these variables with the three Skills Map dimensions.

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People

Appendix C

Academic abilities. These include the variables constituting the academic aptitude factor. They are essentially unrelated to the psychomotor factor. These abilities, particularly the verbal abilities, are also related to dealing with people (r's of .3 to .5).

VerbalDT	.93	-.16	.49
Lang	.91	-.13	.46
ReasonDT	.91	-.06	.38
Intel	.90	-.07	.38
MathDOT	.88	-.01	.26
Num	.88	-.03	.26
MathPAQ	.68	-.04	.17
Data[a]	.88	-.11	.46

Mental activities. Most of these variables are highly correlated (.7) with the academic dimension and moderately (.5) with dealing with people: decision making, reasoning, planning, writing and compiling, combining, and analyzing information. Coding and transcribing information and doing work demanding precision and attention to detail are related to the academic dimension at a lower level. Most of these mental activities are somewhat negatively correlated with the motor aptitudes dimension.

Decide	.67	-.28	.53
ReasonPQ	.70	-.26	.46
Plan	.68	-.32	.52
Combine	.73	-.34	.55
Analyze	.71	-.24	.43
Compile	.73	-.34	.55
Code	.58	-.12	.26
Transcrb	.32	-.18	.34
Write	.76	-.37	.56
Precise	.34	.12	.05
Detail	.38	-.01	.09

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People

Appendix D

Psychomotor abilities. Finger dexterity, manual dexterity, motor coordination, and complexity of dealing with things are highly correlated (.7 to .8) with the motor abilities factor, which is to be expected because the first three variables were summed to create that factor. As was also indicated in the factor analyses, form perception, spatial aptitude, and color discrimination are moderately correlated (.4 to .5) with this factor, though the former two are almost as highly correlated with requirements for academic aptitude. Correlations with the people factor range from 0 to -.5.

Findex	.13	.80	-.20
Mandex	-.30	.79	-.46
Motorcor	-.12	.82	-.29
Formper	.40	.52	-.17
Colordis	.20	.43	-.05
Things[a]	-.05	.74	-.47
Spatial	.41	.42	-.20

Motor Activities. These variables were all classified here as motor activities because they all involve physical activities or controlling machines. However, the correlations make clear that only a few of these dimension scores reflect psychomotor abilities. Performing controlled manual and related activities (DIM13), which of all the dimension scores should have reflected the motor aptitude factor, did indeed do so at a moderate level (r=.4). None of the other dimension scales did so. Two are related only to the vigilance factor that was discussed in the earlier report but which was not used in constructing the occupational classification: controlling machines and processes (DIM11) and using miscellaneous equipment such as aircraft (DIM14). General physical coordination (DIM16) is related (negatively) only to the strength dimension. Apparently, exerting strength and the use of the body and body members in a coordinated fashion (e.g., limb movement without visual control) are not usually required by the same jobs, but neither has any particular relation to requirements for coordination and dexterity of the hands (the psychomotor factor here). General body movement (DIM10) and using machines and tools IDIM14) are associated with jobs requiring *lower* academic aptitude but skilled technical activities are associated with *higher* academic aptitude.

Thus, the psychomotor factor reflects a particular type of motor activity-primarily that involving the hands--and most of the PAQ "dimensions" measuring motor activities are unrelated to the three factors used in the classification.

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Dim10	-.42	.20	-.20
Dim16	.18	.13	.18
Dim15	-.26	.02	-.02
Dim13	-.17	.40	-.33
Dim12	.55	.05	.21
Dim9	-.44	.33	-.45
Dim11	-.04	-.14	.10
Dim14	.10	-.18	.12

Appendix E

Deal with people. Dealing with people often means that contact is required on the job (REQCONT, r=.6) and that it is at a complex level (PEOPLE, r =.8). And as already noted, it tends to be associated with requirements for higher academic abilities.

Dep1	.44	-.40	1.00
People[a]	.59	-.29	.75
Reqcont	.49	-.20	.61

Interpersonal activities. These activities suggest that, whereas some dealings with people are highly correlated with academic aptitudes, others are not. While the DOT variable DEPL (dealing with people) was used to define the people factor because it was less related to academic abilities than some of the other variables (e.g., PEOPLE), it is clear that it is a compromise between items more and less related to academic skills. Just like motor activities, there are actually several dimensions of interpersonal activities.

As was noted in the factor analysis of DOT and PAQ itemes, persuading, instructing, advising, negotiating, coordinating (but without line management authority, e.g., a social director), public speaking, and having staff functions (e.g., administrative assistant) are activities highly associated with jobs both requiring high academic aptitudes and occupations more often requiring dealings with people. Supervising non-employees (SUPERVIS) and entertaining people, catering to their needs, and dealing with the public (DIM21) are only weakly related to academic abilities and create two people-related factors independent of academic abilities when added to the factor anslysis. DIM19, called performing supervisory/coordination activities, is also related to dealing with people but its meaning seemed unclear after examining more detailed results.

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Influ	.35	-.33	.50
Persuade	.60	-.41	.68
Instruct	.48	-.22	.45
Advise	.70	-.37	.59
Negotiat	.60	-.46	.62
Coordin	.58	-.36	.54

Variable	Correlatio ith Skills Map dimension:		
	Academic	Motor	People
Dim19	.06	-.16	.18
Supervis	.27	-.12	.45
Dcp	.58	-.32	-.60
Staffunc	.69	-.37	.49
Pubspeak	.56	-.35	.55
Entertn	.14	-.05	.29
Cater	.01	-.08	.34
Dim21	.07	-.25	.38

Appendix F

Other abilities. Four of these variables correlated either negatively (CLERICAL) or positively (IFTCOOR, STRENGTH, EXERTION) with the strength factor. The two strength variables correlate negatively and clerical aptitude correlates positively with both the academic and people factors. As noted before, short-term memory is associated primarily with dealing with the public, a factor not shown here.

Clerical	.70	-.22	.45
Memory	.20	-.03	.23
Iftcoor	-.12	.20	-.07
Exertion	-.49	.27	-.38
Strength	-.57	.30	-.43

Bipolar interests. An interest in dealing with people and communication of ideas rather than with things and objects (IDATA) is characteristic of both the academic and people factors. The people factor is more highly associated than is the academic one with interests in business versus science (ISCIENCE), in social welfare versus machines (IMACH), and in esteem rather than productive satisfaction (IPRODUCT). In contrast, the academic factor is associated more highly with interest in creative versus routine work (ICREATE), and the psychomotor factor is associated with interests in machines (IMACH), things (IDATA), and productive satisfaction (IPRODUCT).

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Idata	.65	-.35	.73
Iscience	.21	.28	-.47
Icreate	.69	.05	.31
Imach	-.38	.38	-.68
Iproduct	-.33	.48	-.61

Sources of information. Occupations requiring high academic aptitudes or dealing with people both require more frequent use of written materials (WRITTEN), oral communications (VERBALPO), or observation of behavior (BEHAVIOR), though the pattern differs somewhat for the two factors (written materials being more associated with academic aptitudes and observing behavior with the people factor). Use of quantitative and pictorial materials are moderately associated with the academic factor. As noted before, observation of events is associated with the vigilance factor not shown here.

The meaning of the DOT temperament FIF (feeling, ideas, or facts) is unclear and it is not associated with any of the three aptitude dimensions. The DOT temperament SJC (sensory or judgemental criteria) is associated with both the academic and people dimensions and presumably reflects the need for judgment in the face of ambiguous information that is probably characteristic of much high-level work and work dealing with people.

Written	.66	-.20	.41
Quant	.56	-.19	.23
Pictoral	.38	.11	.06
Patterns	.08	.24	-.13
Behavior	.46	-.30	.63
Events	-.03	-.13	.15
VerbalPQ	.53	-.17	.54
FIF	.16	-.04	.11
SJC	.52	-.15	.44

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People

Appendix G

Responsibility. Responsibility for the safety of others (RESPSAF, e.g., avoiding injuries to coworkers) and for material assets (RESMAT) are unrelated to the three aptitude dimensions. General responsibility (RESPGEN) and criticality of the position (CRITICAL) are moderately positively correlated with both the academic and people dimension, but negatively with the psychomotor one.

Respsaf	-.24	.19	-.12
Respmat	.06	-.09	.07
Respgen	.58	-.35	.47
Critical	.48	-.33	.43

Vigilance. These three variables are unrelated to the three major dimensions, which is not surprising because it was shown in the earlier repo that they form an independent dimension.

Recognit	.20	-.04	.11
Viginfre	.06	-.01	.00
Vigchang	.05	-.09	.11

Education and training. Level of formal education (EDUCATN, GED) and length of job-related training (SVP) are highly correlated (.8 to .9) with the academic factor, moderately (.3 to .5) with the people factor, and essentially not at all with the psychomotor one. (The PAQ variable TRAINING is almost the same in content as the DOT variable SVP, specific vocational training, but its correlations with the factors are lower.) The academic factor, and to a lesser extent the people factor, are also correlated with the need for job-related experience (EXPRNCE) and for keeping job knowledge current (UPDATE). Licensing, however, is most highly associated with dealing with people.

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Educatn	.80	-.26	.49
GED	.91	-.06	.38
Training	.42	-.02	.14
SVP	.81	.09	.27
Exprnce	.54	-.15	.25
Update	.63	-.24	.49
License	.25	-.05	.36

Appendix H

Working conditions. The working conditions listed here can be divided into two major groups: the amount of structure to the job and the amount of stress induced by it. In general, lack of structure is most strongly related to the academic dimension: the greater the demands for academic aptitude, the greater the variety and change (VARCH), the less repetitious the work or continuous the workpace (REPETIT, REPCOM, WORKPACE), and the less structured or supervised the activities (STRUCTUR, RECSUPER). Time pressure (TIMEPRES), however, is most highly (but only moderately) correlated with the academic factor. The same pattern of relations, only weaker, is found with the people factor, but the psychomotor factor is generally unrelated to these job conditions.

Having to work with set limits, tolerances, or standards (STS) is moderately associated with both psychomotor and people requirements (R's=.6, .5), but whereas the psychomotor factor is also positively associated with having measurable or verifiable criteria (MVC) for assessing work done, dealing with people means having less measurable or verifiable (i.e., more ambiguous) criteria.

Although the DOT variable PUS (performing under stress) is unrelated to any of the three factors, all the specific types of stress measured by the PAQ are moderately correlated with both the academic (usually about .5) and people dimensions (usually about .6); working under distractions (DISTRACT), in frustrating situations (FRUST), with strained personal contacts (STRAIN) or interpersonal conflict situations (CONFLICT), or having civic obligations (CIVICOB) or making personal sacrifices (SACRIFC). (The negative correlation with the psychomotor factor may be a function of its being negatively correlated with the people dimension, for it is not clear why jobs requiring less psychomotor skill should be more stressful in these terms.)

Non-job-required social contact (SOCCONT) is most associated with the people dimension, but it is fairly independent of all of them.

The patterns of correlations just discussed are consistent with the factor analyses performed earlier and with a few exceptions the patterns all make a great deal of sense. Thus, the DOT and PAQ data probably provide a fairly valid view of job competency patterns and their relation to other job attributes, a view that provides an organized and comprehensible description of job competency requirements and their associated activities.

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Varch	.36	-.01	.32
Repcon	-.71	-.01	-.46
MVC	.39	.28	-.26
STS	-.14	.58	.51
Workpace	-.36	.06	-.20
Repetit	-.53	.09	-.30
Cycled	-.02	-.10	.07
Setproc	-.27	.16	-.30
Timepres	.38	-.09	.30
Structur	.70	-.29	.50

Variable	Correlation with Skills Map dimension:		
	Academic	Motor	People
Recsuper	.61	-.34	.56
Soccont	.18	-.05	.29
Distract	.54	-.29	.58
Civicob	.46	-.34	.59
Frust	.55	-.34	.61
Strained	.49	-.39	.66
Sacrific	.45	-.29	.54
Conflict	.57	-.36	.57
PUS	.03	-.01	.12

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[a] Scoring of this variable has been reversed from that shown in Appendix A to aid in interpretation of the correlations.

Group 1: Low academic, low psychomotor, low people. (E.g., stockhandlers, chambermaids, dishwashers)

This group of occupations is the lowest in terms of academic aptitudes required (Appendix C). The percentiles for the average levels required range from only 2 to 7. Longshoremen, however, seem to require somewhat higher-level mental activities than do the other jobs in this group (decision-making, reasoning, planning, analyzing, and transcribing). Stockhandlers must make great use of written and quantitative materials but otherwise these occupations typically require only verbal sources of information and even that is low relative to other occupations (Appendix F).

These occupations, on the average, require high levels of general body movement (DIM10), handling (DIM15), use of machines, tools (DIM9) and miscellaneous equipment (DIM14), and controlling machines (DIM11), but they are low on all variables indicating dexterity (except manual dexterity, which is moderate) or coordination (Appendix D). They also require greater strength than most occupations, though only longshoremen require great strength (Appendix F).

Requirements are high relative to other occupations for interests in things rather than ideas or people (IDATA) and for routine versus creative work (ICREATE, Appendix F). Consistent with this is the extremely repetitious and structured nature of the work (Appendix H). Nevertheless these workers must exercise a moderate level of vigilance and often have moderate responsibility for safety and materials (Appendix G). Longshoremen, in particular, have responsibility for the safety of others.

Dealings with people are extremely low, the lowest of all groups (Appendix E). Relative to other occupations, this group is average in catering to people's needs, though average means it is of only low importance on the job. Contact with the public is of moderate importance. However, personal stresses (e.g., working in frustrating or strained situations) are low (Appendix H).

Finally, education, training, and job experience requirements are the lowest of all groups (Appendix G). In summary, these jobs demand little but strength, a tolerance of repetitious work, and a moderate level of vigilance.

These occupations employ 2.6% of the workforce (Appendix I).

Group 2: Low academic, low psychomotor, moderate people. (E.g., deliverymen, crossing guards, servants)

This group averages around the 20th to 25th percentile in academic abilities, but somewhat lower on the mental activities (Appendix C). Even so, the deliverymen and crossing guards/bridge tenders do require a moderate amount of planning, transcribing and (like most occupations) a considerable amount of attention to detail. Education and training requirements are low relative to other occupations (Appendix G).

The profile for motor abilities and activities is essentially the same as that for Group 1: considerable movement, handling, and use of equipment, but low dexterity and coordination compared to other occupational groups. These jobs also require moderate strength, but less than Group I (Appendix F). The need for vigilance, however, is fairly high (around the 75th percentile), particularly for the deliveryman and crossing guards/bridgetenders. Not surprisingly, these two occupations have higher than average responsibility for safety and materials and the work of the deliverymen is highly critical to the performance of their organizations (Appendix G). The use of the sources of information listed in Appendix F is low, except for the observation of events which is high for crossing guards/bridgetenders.

Dealings with people -- and with the public in particular -- are at a moderate level. Looking at particular activities, however, only the deliverymen have moderate requirements for persuading, instructing, negotiating, and catering to personal needs (Appendix E). Not surprisingly, the deliverymen also stand out in this group for having more distracting, frustrating, and strained job situations. One would expect ushers to share some of these strains, but no data were available for them.

Although these jobs have relatively high structure and repetition, they vary somewhat in what particular type of structure: for example, the deliverymen have highly cycled activities with high time pressure This group of jobs also requires a relatively high interest in routine versus creative work and in productive satisfaction rather than esteem (Appendix F).

In summary, these jobs are like those in Group 1 in terms of requirements for relatively unskilled physical activity, but they entail more dealings with people, more vigilance, and more responsibility. The jobs are not quite so routine, but still demand considerable tolerance or preference for repetitious and routine activities.

These jobs employ 1.8% of the workforce (Appendix I).

Group 3: Low academic, low psychomotor, high people. (E.g., parking attendants, baggage porters, elevator operators)

PAQ data are available for only two of the seven occupations (personal service attendants and elevator operators), so this group cannot be well described.

Requirements for academic skills are very low, between those of Groups 1 and 2 (Appendix C); so too are demands for motor aptitudes (Appendix D). But as with the previous two groups, this one appears to require considerable gross motor activity (Appendix D) and moderate physical strength or exertion (Appendix F).

Although dealings with people are frequent, they are only at a moderate level of complexity -- speaking/signaling, persuading, diverting (Appendix E). The little data available suggest that some of these jobs have moderate to high responsibility, but involve only extremely low requirements for vigilance.

These jobs also require considerable interest or tolerance for routine work, but more interest in social welfare rather than in machines in contrast to Groups 1 and 2 (Appendix F).

These jobs employ 0.6% of the workforce (Appendix I).

Group 4: Low academic, moderate psychomotor, low people. (E.g., buildozer operators, assemblers, drill press operatives)

Most of the occupations in the first three groups are classified as service workers in the census scheme, particularly those in Group 3 that deal most with people. With increased demands for psychomotor skills in Group 4, most of the occupations are now machine operatives or, to a lesser extent, laborers or craftsmen.

Requirements for academic aptitudes and most mental activities are at or below the 20th percentile (Appendix C), but requirements for psychomotor aptitudes are moderate -- around the 40th to 50th percentiles on the average (Appendix D). Although this group is like the previous three (low psychomotor) groups in requiring considerable motor activity, use of machines, and strength, it differs because many of these occupations also require considerable controlled manual (D1M13) activities (Appendix D). There is considerable variation among the jobs in whether they involve skilled technical work (D1M12), but on the average this group is low relative to all others in this type of activity. Strength requirements are at the 75th percentile, generally at the "moderate" level (Appendix F). A high interest in machines rather than social welfare is required in almost all of the 74 occupations in this group.

Although many of the jobs require contact with the public (Appendix E) the level of involvement is quite low and almost none of the occupations have more than low demands for any interpersonal activities (except for D1M19 which, as noted before, is not readily interpretable). Interpersonal stresses are low (Appendix H).

Responsibility and vigilance vary, but are usually average relative to other groups of occupations (Appendix G). Duplicating machine operators, drill press operatives, and weavers require only low levels of responsibility and vigilance in contrast to locomotive engineers and stationary firemen who require high levels of both. Education and training demands are relatively low. Although the jobs vary from high to low in how repetitious and structured they are, on the average they are quite routine (Appendix I

In summary, these occupations are relatively low and homogeneous in their demands for academic aptitudes and mental and interpersonal activities. They are generally physically active jobs requiring hand dexterity and coordination, but particular motor activities and responsibilities vary considerably. They are routine jobs but they satisfy interests in working with things and machines. They also employ a very large proportion of the labor force -- 19.1% (Appendix I).

Group 5: Low academic, moderate psychomotor, moderate people (E.g., garage workers, taxi drivers, garbage collectors)

These 8 occupations are primarily laborers and transport equipment operatives in the census scheme. As a rule, very few operatives or craftsmen are found in the moderate-or high-people groups, even if high psychomotor skills are required.

These occupations are not particularly distinguished from the previous ones in the low level of academic aptitudes required, but they tend to require more writing and more combining and analyzing of information. Taxicab drivers, in particular, require a moderate level of a wide variety of mental activities. Both taxicab drivers and railroad brakemen appear to require considerable short-term memory as well (Appendix F). Group 5 occupations are about average in requirements to use behavior, events, and oral communications as sources of job information (Appendix F). Requirements for using written, quantitative, patterns, or pictorial sources are lower than average. Education and training demands are low, but taxi drivers do need to be licensed (Appendix G).

Like the previous groups, these jobs require considerable physical activity and exertion (Appendices D and F), but the need to control machines (D1M11), exercise vigilance and take responsibility for the safety of others are fairly high on the average, particularly for taxi drivers (Appendices D and G).

Although contact with people is required by these jobs, it is of a fairly low level. Although these jobs are average (e.g., on persuading, advising, public speaking) or above average (e.g., on entertaining and catering to needs) on many of the interpersonal activities, these demands are of a fairly low level (Appendix E). (Jobs in general have low requirements for these interpersonal activities.) Correspondingly, these jobs have at least average interpersonal stresses, taxicab drivers experiencing the highest levels of stress (but only a moderate level) among these 8 occupations (Appendix H).

These jobs are less structured, but just about as repetitious as the previous groups of jobs (Appendix H) and so most require a preference or tolerance for routine rather than creative work (Appendix F).

In summary, these jobs are similar to Group 2 occupations in that they are distinguished from other low-level groups by greater requirements for vigilance and responsibility, perhaps because of their greater involvement with people. Although there is of course a greater demand for psychomotor skills, there is also a suggestion of somewhat higher demands for mental and interpersonal activities for some of the jobs in Group 5 compared to those in Group 2. Nevertheless, education and training demands are still low. The interests required are also the same.

These occupations employ 1.5% of the work force (Appendix I).

Group 6: Low academic, moderate psychomotor, high people. (E.g., food counter and fountain workers, child care workers)

Only two occupations are found in this group, both of them being service workers in the census scheme.

Child care workers appear to have high demands for most of the mental activities but relatively low academic aptitude requirements (Appendix C). Behavior, events, and oral and written communications are all important sources of job information (Appendix F). In contrast, the food counter workers have no such demands for mental activity or information. Child care workers also have somewhat higher education and training demands demands and often require a license (Appendix H).

Although the DOT classifies child care workers as having contacts with people of only low complexity, the PAQ nevertheless classifies them as having high requirements for most interpersonal activities such as persuading, instructing, advising, and public speaking (Appendix E). (To some extent this apparent disagreement may result from the two sources of data rating different particular kinds of child care workers.) Once again, food counter workers have few such demands. Not surprisingly, child care workers also have greater interpersonal stresses, though both jobs require working under very distracting circumstances (Appendix H). The former also require considerable greater vigilance and more responsibility (Appendix G).

Both are quite active jobs involving a lot of handling (D1M15, Appendix D) and they require above average (but only moderate) strength or exertion (Appendix F). Demands for short-term memory are high for the food workers.

The jobs are of moderate structure, though the type of structure varies. For example, child care workers must follow more set procedures, but food workers have a more specified workpace and greater time pressures (Appendix H).

In summary, the two occupations in this group differ considerably in the specific mental and interpersonal activities and responsibilities required of them, though they are similarly low in demands for academic aptitudes and moderate in both psychomotor aptitudes and in dealing with people. Both are physically active jobs of greater than average routine or repetition, and both require an interest in business rather than science.

These jobs employ only 0.4% of the work force (Appendix I).

Group 7: Low academic, high psychomotor, low people. (E.g., postal clerks, shoe repairmen, sewers and stitchers)

Most of these 7 occupations are craftsmen or operatives. PAQ data are available for only 3 of them, limiting the generalizations which can be drawn about the group.

These occupations are similarly low in academic aptitudes and above average in PAQ mental activities required (Appendix C). Demands for short-term memory are moderate, with only the postal clerks requiring high clerical aptitude (Appendix F). Educational requirements are low but training and experience required is high for a few of the occupations (Appendix C).

These jobs require few dealings with people, and require low (but no lower than average) interpersonal activities (at least those for which data were available, Appendix E). Interpersonal stresses and distractions are low but about average in relation to all other groups (but higher than for Groups 1 to 4).

Compared to the other low-level groups, these occupations require less general physical activity (D1M10) and exertion or strength and greater use of machines, tools, and equipment (D1M19) as well as much higher psychomotor aptitudes. These greater skills do not appear to be translated, however, into a greater importance of controlled manual work (D1M13) as often appears to be the case (Appendices D and F). Vigilance and responsibility are average to above average for the occupations for which there are data (Appendix G). A high interest in machines and things is required in almost all these occupations (Appendix F).

These jobs are fairly structured and repetitious or continuous and almost all have high demands for set limits, tolerances, or standards (STS); postal clerks experience high time pressure (Appendix H).

In summary, these jobs are distinctive from all other low-level jobs in their demands for high psychomotor skills and greater use of machines. Demands for exertion tend to be lower on the average.

These jobs employ 1.9% of the work force (Appendix I).

Group 8: Low academic, high psychomotor, moderate people.

There are no occupations in this group.

Group 9: Low academic, high psychomotor, high people.

There are no occupations in this group.

Group 10: Moderate academic, low psychomotor, low people.

(proofreaders)

There is only one occupation in this group, proofreaders.

The occupation of proofreader demands high verbal skills but low mathematical aptitude (Appendix C). There is a high demand for precision and attention to detail, with average levels of the lower-level mental activities (e.g., coding, transcribing) but low levels of the other mental activities. Education and training is moderate, but no higher than average (Appendix G).

Written sources of information and clerical aptitude are very important (Appendix F). Demands for short-term memory and quantitative sources of information are moderate. Dealings with people and interpersonal activities rival Group 1 for being extremely low (Appendix E). Interpersonal stresses are also low (Appendix H).

Demands for vigilance and responsibility for safety and materials are minimal, though general responsibility to the organization is moderate (Appendix G). Demands for physical exertion are extremely low (Appendix F). There is a fair amount of handling, but general physical activity is low (Appendix D). Use of machines and tools is very low (Appendix D), as are the demands for an interest in things versus data (Appendix F). An interest in routine work is required (Appendix F) because the job is quite repetitious and structured, with very little variety or change, and with high demands for set procedural standards (STS) and criteria for judging performance (MVC).

In summary, this job is quite distinctive for its high demands for precision and following set procedures as well as for its extreme lack of demands for physical and interpersonal activities. It is also unusual because it demands much higher verbal than mathematical aptitude.

This job employs 0.04% of the work force (Appendix I).

Group 11: Moderate academic, low psychomotor, moderate people. (E.g., library attendants, stock clerks and storekeepers, bartenders)

These occupations demand average to below average academic aptitude and mental activities, with the exception of the mental activities more suggestive of clerical activities (compiling, coding, transcribing) which are somewhat above average. Although attention to detail is fairly typical, it is generally high (Appendix C). Demands for clerical aptitude and short-term memory are moderate but a bit above average (Appendix F).

Handling materials is above average, being particularly high for mail handlers and bartenders, but all other physical activities are moderate in level and average among all occupations (Appendix D). Only moderate exertion, nothing above average, is required (Appendix F). Demands for vigilance and responsibility are low relative to other occupations, although bartenders are critical to the performance of their organizations (Appendix G).

Bartenders are outstanding in this group in demands for catering to people's needs and dealing with the public (D1M21). The other occupations are low in requirements for the specific interpersonal activities listed, though they are average on most of them (Appendix E). Thus, like many occupations that require dealings with people, it is not at all clear from the PAQ and DOT data just what they do for or with people. These occupations do, however, require considerable use of written and oral sources of information, perhaps accounting for some of their dealings with people (Appendix F). Neither do these jobs require any particular interest either in business or social welfare. While these jobs have moderate or high distractions, all other interpersonal stresses are low (Appendix H).

Job structure is higher than average, but only moderate in level. Bartenders have somewhat less repetitious work but more set procedures to follow and greater time pressures.

In summary, most of these jobs seem to be low-level clerical jobs with a moderate component of handling the materials they work with. They deal with people to a moderate degree, but it may be largely for purposes of organizing work activities. When dealing with the public as bartenders do, this constitutes catering to people's needs. Responsibility is low, but not strikingly so, and job structure is high, but not strikingly so.

This group employs 2.5% of the work force (Appendix I).

Group 12: Moderate academic, low psychomotor, high people. (E.g., bill collectors, receptionists, guards and watchmen)

These 15 occupations tend to be what are called "boundary personnel" in other contexts, personnel who represent the organization to the public or deal with people outside the organization. Many of the jobs here are either service or clerical workers in the census scheme.

These occupations range from high to low in their demands for specific mental activities, but on the whole they are somewhat above average in these demands (Appendix C). Sheriffs, boarding house keepers, and hucksters have particularly high demands for activities such as deciding, reasoning, and planning. These particular occupations also require high use of written materials and observation of behavior (Appendix F). Clerical aptitudes and short-term memory are moderate for this group.

All these occupations have frequent dealings with people, but the nature of those activities varies (Appendix E). Housekeepers and hucksters cater to people's needs; these workers, together with railroad conductors, sheriffs and guards, also do a moderate amount of persuading, instructing and advising. But counter clerks, dispatchers, enumerators, receptionists and recreation attendants do little of any of these activities. Perhaps their activities are more routinized and less subject to resistance from the people they deal with. Interpersonal stresses such as frustrating and strained interpersonal situations are, in fact, fewer in these latter occupations (Appendix H). Sheriffs and boarding house keepers appear to have the most personally stressful and demanding jobs in this group.

Demands for psychomotor skills are low, but demands for most motor activities are at least average (Appendix D). Housekeepers appear to have quite physically active jobs. Only low to moderate exertion is required of this group (Appendix F). Vigilance is high for railroad conductors, guards, and sheriffs. General and material responsibility is high for these three jobs as well as for the various types of housekeepers, with most of them being critical to the performance of their organizations (Appendix G). Education and training required is generally moderate, but railroad conductors and sheriffs require considerable job-related training and experience. Licensing requirements are above average for this group.

These occupations are characterized by a moderate amount of structure on the average, though there is variation from job to job (Appendix H). For example, railroad conductors have very repetitious, cycled activities requiring set procedures and meeting time schedules. In contrast, receptionists have few of these particular demands although the job is highly structured.

In summary, all these occupations have frequent dealings with people but they can be divided into highly-demanding versus less-demanding subgroups. The housekeepers, railroad conductors, sheriffs, and guards have higher demands for a variety mental and interpersonal activities, have greater responsibility, and suffer more stress in their dealings with people than do counter clerks, dispatchers, enumerators, receptionists, recreation attendants, and even bill collectors. None are particularly demanding of academic or psychomotor aptitudes, but most are at least moderately physically active.

These occupations employ 2.1% of the work force (Appendix I).

Group 13: Moderate academic, moderate psychomotor,low people. (E.g., carpenters, compositers, auto mechanics)

Most of these occupations are classified as craftsmen in the census scheme ; a smaller number are classified as clerical workers.

Group 13 is similar to Groups 11 and 12 in its somewhat below average demands for academic aptitude (Appendix C). Most demands for mental activities are also somewhat below average, making them lower than those of Group 12 (that dealt more with people but less with psychomotor skills) but quite similar to Group 7 (that required lower academic but higher psychomotor aptitude).

These occupations demand somewhat higher than average psychomotor aptitudes and are considerably higher (at the 70th percentile) than the previous groups in complexity of involvement with things (Appendix D). Most operate or set up machines or do precision working, the highest levels of involvement with things. There is moderate to heavy use of machines and tools (D1M9), controlling machines and processes (D1M11), and controlled manual work (D1M13). General body movement (D1M10), an interest in machines, level of exertion, and use of patterns as a source of information (Appendix F) are also above average, the first two usually being quite high. Demands for vigilance and responsibility are only average, though most mechanics have high responsibility for materials (Appendix G). Many of the occupations require long training times and about half require considerable prior job-related experience, but it is not clear that the demands for the group as a whole are above average.

Demands for most interpersonal activities are low, but they are not much below average because jobs in general require little such activity (Appendix E). Likewise, interpersonal stresses are low but not much below average (Appendix H). These jobs are moderate in degree of overall job structure and repetition, but most have set standards for performing (STS) and evaluating (MVC) work (Appendix H).

In summary, these occupations are similar to their counterparts at a lower academic level (Group 4) in their lack of involvement with people and in their satisfaction of interests in machines and objects, but they are less structured, have more demands for various interpersonal and mental activities, higher educational and training requirements, and a more complex involvement with things. Thus the work demands a somewhat greater variety of skills and opportunity to structure one's own activities.

These occupations employ 8.3% of the work force (Appendix I).

Group 14: Moderate academic, moderate psychomotor, moderate people. (E.g., mail carriers, plumbers, dental assistants)

Occupations in this group come from a variety of census groups, though most often from craftsmen.

These jobs are at least average in demands for all academic and clerical aptitudes and mental activities (Appendix C). Psychomotor aptitudes and motor activities are generally somewhat above average (Appendix D), with most jobs requiring moderate to high levels of general body movements (D1M10) or coordination (D1M16) and activities with the hands (D1M15, D1M13) or machines (D1M9, D1M11, D1M14). Demands for vigilance and responsibility are somewhat above average (Appendix G). A few of the occupations (electrotypers, power station operators, health aides, and firemen) have particularly high responsibility. Education and training are at least average, with many of the jobs having long training times (Appendix G).

Interpersonal activities are generally low, but above average (Appendix E). Firemen require moderate levels of persuading, instructing, advising, negotiating, and coordinating; athletes and health aides require moderate levels of the first three of these; but other occupations require less. Firemen also have the most (moderately) interpersonally stressful of these jobs (Appendix H).

In summary, this group seems remarkable only for its moderate demands in all areas examined. A few particular occupations such as firemen have more marked responsibility and stress.

These occupations employ 4.3% of the work force (Appendix I).

Group 15: Moderate academic, moderate psychomotor, high people. (E.g., telephone operators, bus drivers, waiters)

These occupations, which are from a variety of census groups, require average academic aptitudes. They are fairly average in demands for the various mental activities, except in demands for precision and attention to detail which are below average (though high for a few occupations, Appendix C). Clerical aptitudes are moderate, just a bit above average (Appendix F).

Psychomotor aptitudes, motor activities, and level of exertion are uniformly average on the whole, though there are higher than average demands for controlling machines (D1M11, Appendices D and F). Practical nurses appear to have the highest demands for motor activity of these jobs, though their motor skill requirements are the same. Demands for vigilance are a bit above average for the group, but the individual occupations range from low (e.g., sales clerks and waiters) to high (e.g., bus drivers and practical nurses, Appendix G).

Dealings with people are high, though the particular interpersonal activities required differ from job to job (Appendix E). Waiters must do some persuading and a lot of catering to people's needs; practical nurses must also, but they also do a lot of instructing and some advising, negotiating, and supervising of non-employees. Retail salesmen must do a lot of persuading and some instructing and advising; in contrast, telephone operators who also must deal extensively with the public do none of these interpersonal activities to any extent. Not surprisingly, these Group 15 occupations rely to a relatively high extent on behavior and events as sources of job information (Appendix F). Interpersonal stresses are somewhat above average, but generally they are only low to moderate (Appendix H). Responsibility, however, is high for some of these occupations: safety for bus drivers and practical nurses, and materials for foremen and bus drivers (Appendix G).

This group is different than most the previous ones in the consistency of interests in people it requires. It is quite above average in interests in social welfare versus machines, business versus science, people and data versus machines, and esteem versus productive satisfaction (Appendix F). These workers are not required to be particularly interested in either routine or creative work, because the work is generally not highly structured or repetitious, though that does vary from job to job as does the type of structure involved (Appendix H). Education and training demands are usually moderate, though the amount of job experience required varies considerably and the need to update job knowledge is high in a few occupations (Appendix G).

In summary, these occupations are uniformly moderate in academic and psychomotor skills and activities, but range widely in the specific interpersonal activities, responsibilities, and job conditions they experience. Much like Group 12, this group stands out from the low-level jobs dealing with people in its consistent requirements for interests in people, business, and social welfare versus things, objects, machines, and productive satisfaction. And this is so despite the fact, unlike Group 12, it does deal with some machines to a greater than average extent and requires moderate psychomotor skills.

These occupations employ 9.2% of the work force (Appendix I).

Group 16: Moderate academic, high psychomotor, low people. (E.g., cabinet makers, photoengravers, tool and die makers)

This group consists primarily of craftsmen.

These occupations are average in academic aptitudes required, but their profile of verbal versus mathematical aptitudes illustrates an interesting trend within both the moderate- and high-academic strata of occupations (Appendix C). Group 16 has requirements for math aptitude (MATHDOT, NUM) that are relatively higher than those for verbal aptitude (VERBAL, LANG); the percentiles are, respectively, in the 50's for math but only the 40's for verbal. This predominance of math requirements is true for 4 of the 5 groups with low dealings with people and with low to moderate academic requirements (Groups 13, 16, 22, and 25). The reverse pattern is found for the groups with high dealings with people (Groups 12, 21, 27 and perhaps 15 and 18), verbal abilities being higher than math ones.

Demands for the mental activities are average or below (Appendix C). A few occupations have high demands for decision making and reasoning (aircraft mechanics, pattern and model makers), but otherwise demands are only low to moderate. Like most other groups, precision and detail are important. Written, quantitative, and oral sources of information are of average importance, but use of patterns is much higher than average (primarily because of the demands of pattern and model makers and of photoengravers), as is the use of pictorial materials (Appendix F). Events and behavior are relatively unimportant probably because these occupations have relatively little to do with controlling machines or dealing with people (Appendices D and E). And consistent with this, there are only low demands for vigilance (Appendix G).

Demands for all psychomotor aptitudes are very high relative to other occupations, generally from the 80th to 90th percentiles (Appendix D).

Manual dexterity, form perception, and spatial aptitude are high for most of the 21 occupations in this group. Controlled manual activities (D1M13) are particularly important among the motor activities, with less emphasis (an average level) on general body movement (D1M10), and relatively little handling (D1M16), controlling machines (D1M11), or using miscellaneous equipment (D1M14). Level of exertion is generally moderate (Appendix F). The mechanic with his hand tools represents well the type of motor activities carried out in this group. Most of the occupations clearly stress productive satisfaction rather than esteem (IPRODUCT) and an interest in processes, machines, or techniques versus social welfare (IMACH, Appendix F).

This group is below average in dealings with people, seldom having more than a low requirement for any of the interpersonal activities (Appendix E). And although some of the occupations involve working under moderate distractions, there are seldom any interpersonal stresses (Appendix H).

Amount of structure and repetition is average. The jobs are, however, almost always high in requirements for set limits and standards (STS) for performing work and in having measurable and verifiable criteria (MVC) for evaluating it.

In summary, this is a set of jobs homogeneous in its clear standards for how work must be performed; the skilled use of the hands in working with tools, machines, or equipment; the enjoyment of productive satisfaction; and the lack of demands for dealing with people. Mathematical and spatial aptitudes are more important than verbal ones.

This group employs 3.3% of the work force (Appendix I).

Group 17: Moderate academic, high psychomotor, moderate people. (E.g., stenographers, electricians, drywall installers)

Although these 4 occupations of course share common demands along the three major competency dimensions, their particular job demands seem quite different. Nor is it clear that they are particularly different in their activities than the occupations in Group 16.

Stenographers require higher verbal and clerical aptitudes than the other occupations in this group, as well as greater finger dexterity and hand-related motor coordination and use of written sources of information (Appendices C, D, and F). In contrast, electricians require greater manual dexterity, spatial aptitude, and use of pictorial materials (Appendices D and E), and drywall installers and brickmason apprentices require greater strength (Appendix F).

Mental and interpersonal activities are not distinctive for any of the three occupations for which there are PAQ data (Appendices C and E). Motor activities are, however (Appendix D). For example, general body movement (D1M10) is low for stenographers, moderate for electricians, and high for brickmasons apprentices. The remaining motor activities also differ across the three occupations.

All four occupations require an interest in machines, processes, or techniques rather than social welfare (Appendix F). All are subject to set limits or standards (STS) and all but stenographers have measurable criteria for their work (MVC). Otherwise, the jobs seem to be only moderately structured on the average and not particularly stressful (Appendix H).

In summary, these jobs are similar in the general competencies and interests required and in job structure. Although they deal with people to a moderate extent, it is not really clear what those dealings consist of. Although their motor skills are all moderate on the average, the particular aptitudes required and motor activities performed are different. This is a heterogeneous group not easily described.

This group employs 0.8% of the work force (Appendix I).

Group 18: Moderate academic, high psychomotor, high people. (E.g., barbers, hairdressers, and cosmotologists, personal service apprentices)

Four of these 5 occupations are service workers in the census classification. PAQ data are available for only 2 of the 5 occupations, so little can be said about this group.

These occupations require somewhat below average academic aptitudes (Appendix C), but higher than average (though generally only moderate) psychomotor skills (Appendix D). They have much dealing with people, but it is generally only at a low level (e.g., serving, Appendix E). Demands for clerical abilities range from high (clerical assistants) to low (hairdressers, personal service apprentices), and lower than average (generally only low to moderate) physical exertion is required (Appendix F). The work appears to have somewhat less than average structure (Appendix H), and sometimes even seems to require an interest in creative rather than routine work (barbers, personal service apprentices, Appendix F). This group generally requires an interest in social welfare rather than machines and processes and in all cases an interest in business rather than science.

These occupations employ 0.9% of the work force (Appendix I).

Group 19: High academic, low psychomotor, low people. (E.g., political scientists, numerical control tool programmers, authors)

There are only 3 occupations in this group, all of them professionals in the census scheme. PAQ information is available for only one of the occupations.

On the average, these occupations require above average academic abilities, though they vary from high (political scientists, tool programmers) to low (authors) in math aptitude required (Appendix C). Demands for psychomotor abilities are extremely low, lower for than any previous group, with the exception of tool programmers, who require high levels of form perception and spatial aptitude (Appendix D). These occupations deal with things at the lowest level of complexity (the zero percentile). Dealings with people are below average, but are of moderate complexity (Appendix E). Clerical aptitudes range from moderate to high (political scientists) and demands for strength or exertion are extremely low (Appendix F). High levels of both education and training are required (Appendix G). The interests required vary somewhat; political scientists require an interest in science and creative work, tool programmers in science, machines, and productive satisfaction, and authors in data and people versus things and in creative work (Appendix F). This group differs from the previous ones primarily because it is higher in academic abilities and training required and because it is very much lower in demands for psychomotor skills and exertion.

These occupations employ 0.04% of the work force (Appendix I).

Group 20: High academic, low psychomotor, moderate people. (E.g., librarians, construction inspectors, estimators and investigators)

These 4 occupations are found in the professional, managerial, and clerical census groups.

As with all the groups requiring high or very high academic abilities, these occupations also require high intelligence and complex dealings with data such as analyzing, coordinating, and synthesizing data (Appendix C). Occupations requiring only low to moderate academic abilities rarely require more than computing and compiling data. The mental activities required differ from one occupation to another in this group, but all require moderate to high levels of each of the activities and the group as a whole is above average in such requirements. Librarians require high levels of planning and deciding and some of the inspectors require high levels of compiling, combining, and transcribing data.

Dealings with people are required and above average, but of only moderate complexity (Appendix E). The particular interpersonal activities are similar across the occupations, and they tend to require moderate to high levels of persuading, instructing, and advising. Interpersonal stresses are definitely above average for the group as a whole, with the inspectors, except construction, facing high levels of distraction, frustration, and strained and conflict-ridden personal contacts (Appendix H). The librarians and estimators face only low stresses.

Sources of job information vary, but all 4 make moderate to high use of written and oral communications and quantitative materials (Appendix F). The inspectors also make moderate to high use of events and pictorial materials. Requirements for clerical aptitude and short-term memory are above average and at least moderate in magnitude.

The psychomotor skills of finger dexterity, manual dexterity, and motor coordination are low, but demands for form perception and spatial aptitudes are average and moderate in level (Appendix D). As was noted in an earlier section, form perception and spatial aptitudes are moderately correlated with the academic as well as the psychomotor competency dimensions. All hand-related activities are relatively low--controlled manual activities (D1M13), handling (D1M15), and use of tools or equipment (D1M9, D1M14). However, these jobs often involve considerable controlling of machines (D1M11) and skilled technical activity (D1M12).

Demands for vigilance are average overall, and range from low (librarians, estimators) to moderate (the 2 types of inspectors, Appendix G). General responsibility is high, with the inspectors being particularly critical to the performance of their organizations. It is also important for the inspectors to update their job knowledge. As with many occupations requiring moderate academic aptitudes and with most occupations requiring higher academic abilities, these jobs require long (over one year's) job training (SVP).

These 4 jobs are not repetitious, nor is the work pace set, but they are only moderately structured (Appendix H). Procedures are fairly well set and time pressure is generally moderate.

In summary, the 4 jobs require high academic aptitudes, intelligence, and general responsibility, as well as moderate to high levels of the mental activities such as planning and analyzing data. The inspectors stand out from the other 2 occupations in this group by facing greater interpersonal stresses and needs for vigilance and updating job knowledge. Hand-related aptitudes and activities are low, but much of the work (primarily the inspectors') is considered skilled technical work and requires spatial aptitude and form perception. Thus, the psychomotor skills and activities required tend to be more analytical than is the case with the previous groups required. No particular interests in people are required and the moderate dealings with people seem to be for the purpose of completing the more analytical (e.g., inspection) activities.

These occupations employ 0.6% of the labor force (Appendix I).

Group 21: High academic, low psychomotor, high people. (E.g., social workers, buyers, sales representatives)

These 30 occupations are mostly professional, managerial (including farm), or sales workers.

As noted earlier, this group has relatively higher requirements for verbal than math aptitude; percentiles for the former are in the 70's and for the latter are in the 60's (Appendix C). Most of these occupations have high requirements for the mental activities of decision making, reasoning, and planning. Demands for combining, analyzing, and compiling data and for writing are either moderate to high and are definitely above average on the whole.

Dealings with people are at a highly complex level for most of the professionals (i.e., supervising, instructing, negotiating, mentoring) but at only a moderately complex level (e.g., persuading and diverting) according to the DOT estimate (PEOPLE) for the remaining occupations (Appendix E). Looking at specific interpersonal activities measured by the PAQ, most of the occupations have moderate to high levels on almost all these activities and the percentiles are generally in the 70's and 80's. The clerical (e.g., ticket agents) and service workers (e.g., stewardesses) in this group tend to have lower interpersonal requirements. Although professionals, managers, and sales workers in this group all do a fair amount of persuading, instructing, advising, and negotiating, only the professionals have substantial involvement in supervising non-employees and in coordinating people (without line management authority).

Not surprisingly, written and oral communications and observations of behavior are important sources of job information (Appendix F), and high interests in data or people versus things are required (Appendix F).

With the exception of most of the professional workers, these occupations require an interest in business; the professional workers tend to require interests in social welfare. Interpersonal strains are relatively high (with percentiles around 80), particularly for elementary teachers and policemen (Appendix H). Demands for vigilance are average, but for responsibility and updating job information, they are above average. Most of the professionals, managers, sales workers, and policemen have high general responsibility and are critical to the performance of their organizations (Appendix G). Managerial workers also have high responsibility for material assets.

All psychomotor aptitudes are low (Appendix D). Demands for exertion are below average and are generally low to moderate. Most motor activities are generally moderate, although elementary teachers and stewardesses require a lot of general body movement as well as several other activities.

These occupations, particularly the professional, managerial, and sales ones, tend to be only loosely structured (Appendix H). Time pressure is at least moderate, but the work pace and procedures (STS) are not set, the work is not repetitious, and the supervision required is relatively low. However, no particular interest in creative work seems to be required (Appendix F). Moderate to high levels of education and training are required.

In summary, this group seems distinctive from previous ones discussed, not only because it has high requirements for both academic and interpersonal aptitudes and activities, but also because it is considerably less structured and gives workers much more discretion in determining when and how the work is done even though their performance is often critical to the performance of their organizations.

These occupations employ a sizeable proportion of the labor force--7.0% (Appendix I).

Group 22: High academic, moderate psychomotor, low people. (E.g., chemical technicians, surveyors, bookkeepers)

Three of these 4 occupations are professional workers in the census scheme, most of them being technicians.

These occupations require relatively higher math than verbal ability; percentiles are, respectively, in the 80's and 60's for math and verbal aptitudes (Appendix C). Requirements for decision making, reasoning, planning, combining, and analyzing are moderate and generally somewhat above average. Compiling and transcribing data are also generally moderate but are above average. Use of pictorial materials is very high at the 92nd percentile, and use of written and oral communications is also high; observation of behavior and events is not important (Appendix F).

Psychomotor aptitudes are definitely above average, with demands for form perception usually being high. All but the surveyors have highly complex dealings with things, though this is not much above the average (Appendix D). Except for bookkeepers, the work is considered highly skilled technical work (D1M12). General activity and manual activities are about average, but the technicians make considerable use of tools, machines, and equipment (D1M9). Demands for vigilance are moderate for the surveyors and technicians, and all but the surveyors have only moderate responsibility (Appendix G). Demands for exertion or strength are below average and demands for clerical aptitude above average, particularly for the bookkeeper (Appendix F).

Dealings with people and demands for almost all interpersonal activities are low (Appendix E). Interpersonal stresses are below average (Appendix H).

Job structure and repetition are moderate, but there are set standards for performing (STS) and evaluating (MVC) work (Appendix H).

Except for bookkeepers, the work demands an interest in science and in machines, techniques, or processes rather than social welfare (Appendix F).

In summary, this work is highly quantitative and has little to do with people. Although the work deals at a complex level with things, it is of a very technical, scientific nature rather than of a very mechanical and manually manipulative one. Bookkeepers break from this pattern by having work of a more clerical and less scientific nature.

These occupations employ 2.4% of the work force (Appendix I).

Group 23: High academic, moderate psychomotor, moderate people. (E.g., industrial engineering technicians, dancers, payroll and time keeping clerks)

With the exception of the payroll clerks, this seemingly heterogeneous group of 6 occupations is found in the professional group in the census scheme. Only 4 of the 6 have PAQ data.

These occupations generally require moderate but above average (around the 70th percentile) academic aptitudes (Appendix C). The same statement can be made about the mental activities with the exception of air traffic controllers. This occupation requires high levels of decision making, reasoning, planning, and combining information.

Demands for psychomotor aptitudes are generally moderate and about average (Appendix D) and demands for exertion below average (Appendix F). Spatial aptitude and complexity of involvement with things range from high to low depending on the occupation. The pattern of motor activities required also varies among the 4 occupations for which there are PAQ data. For example, use of machines, tools, or equipment (D1M9) ranges from high (air traffic controllers and photographers) to low (payroll clerks); handling (D1M15) also varies from high (photographers) to low (air traffic controllers). Clerical aptitude, eye-hand-foot coordination (IFTCOOR), needs for vigilance and responsibility also show similar variation (Appendices F and G). As would be expected, the air traffic controllers have high demands for vigilance and responsibility in contrast to the other occupations. Sources of job information vary. Air traffic controllers depend heavily on written, oral, and pictorial information as well as on the observation of events; payroll clerks depend on written, quantitative, and oral sources, but on none of the others.

Dealings with people are moderate, but range from high (dancers) to low (photographers and some of the technicians) in complexity (Appendix D). Demands for all interpersonal activities are low except for air traffic controllers (who do persuading, negotiating, advising, and a lot of instructing) and photographers (who do some instructing and advising). Workers in the 4 occupations for which there are PAQ data work under moderate distractions (Appendix H), but interpersonal stresses are low except for the air traffic controllers (who also had the most interpersonal activities).

Job structure varies among the jobs, some being very loosely structured (air traffic controllers) or having high time pressures (air traffic controllers, photographers, Appendix H). Interests in data versus things, people versus machines, creative versus routine work, and productive satisfaction versus esteem also vary widely but in patterns that would be expected (Appendix F).

In summary, this group is extremely heterogeneous in activities, interests, and responsibilities required. It seems to be more of a catch-all group than anything else.

These occupations employ 0.4% of the work force (Appendix I).

Group 24: High academic, moderate psychomotor, high people. (E.g., home-management advisors, adult education teachers, ship officers)

Five of these 9 occupations are professional workers.

Academic aptitudes are around the 70th percentile of all occupations, as are most of the more highly academically-related mental activities (deciding, reasoning, planning, combining, and writing, Appendix C). The two teachers for which there are data and home management advisors are particularly high on these mental activities. The teachers and home management advisors also have the most complex dealings with people (Appendix E) and, specifically, have high demands for instructing and persuading. Teacher aides have lower requirements for interpersonal activities, though they do have moderate demands for instructing, coordinating, and supervising non-employees. Cashiers have only low interpersonal demands; presumably their dealings with people are very routinized (as is suggested by the high degree of structure of their jobs, Appendix H) and demand little in the way of interpersonal skills and activities. This is in clear contrast to the teachers and home advisors who have moderately to loosely structured jobs and more stressful and responsible ones (Appendices G and H). Likewise, written, oral, pictorial, and behavioral sources of information are less important to cashiers than to the other occupations (Appendix F). The health technologists fall between the cashiers and the other occupations in demands for interpersonal activities. Several of the occupations (adult education teachers and teacher aides) appear to require an interest in social welfare, and most require at least an interest in data and people versus things (Appendix F). Some (but not the teachers) require an interest in business.

Psychomotor aptitudes are generally moderate and average, with the exception of high demands for form perception and spatial aptitude required of health technologists, adult education teachers, and ship officers (Appendix D). Most psychomotor activities are average to above average, though the pattern differs for specific occupations. The exertion demanded is low to moderate and only around the 30th percentile (Appendix F).

In summary, the teaching jobs have high academic and interpersonal demands, higher than those of the technologists, cashiers, and teacher aides in this group, even though they all have extensive dealings with people. A few of these occupations have high demands for form perception and spatial aptitude, but are otherwise moderate in psychomotor demands. Interests vary somewhat, but are generally people-related. Most of the jobs are loosely structured but only the art teachers require an interest in creative work.

These occupations employ 1.7% of the work force (Appendix I).

Group 25: High academic, high psychomotor, low people. (E.g., radio operators, machinists, carpet installers)

This group includes 15 titles most of which are craftsmen or technical workers in the professional category.

Verbal abilities are around the 60th percentile and math abilities around the 70th, and all such demands tend to be moderate rather than high in magnitude (Appendix C). In contrast to the other "high academic" groups already discussed, demands for mental activites, particularly the higher level ones (e.g., deciding, reasoning, planning, combining data), are below average with most percentiles in the 30's and 40's. The demands for mental activities are more similar to the moderate academic groups (where most craftsmen are found) than the high ability ones. The technical workers in the professional category (electrical and mechanical technicians, radio operators) have higher demands for mental activities than do the craftsmen and crafts apprentices in this group.

All but the tailors in this group have complex dealings with things--operating, controlling, or setting up machines or doing precision work (Appendix D). And most of the occupations require high spatial aptitude, use of tools or equipment (D1M9), and controlled manual activities (D1M13). The crafts workers appear to require particularly high levels of manual dexterity. Most of the jobs require only low to moderate handling (D1M15), general body movement (D1M10), and exertion (Appendices D and F).

Written and oral sources of information are the most important, though not above average for occupations in general (Appendix F). Use of pictorial and quantitative information is generally at least moderate and above average, but observation of behavior and events is unimportant (Appendix F). This is consistent with the very low level of involvement this group has with people (Appendix E). Demands for the interpersonal activities are almost always low, and the jobs are not stressful in personal terms (Appendix H). Demands for vigilance are moderate at most and responsibility is generally below average (Appendix G).

Unlike many of the high academic ability groups, these Group 25 occupations are fairly structured and repetitious (Appendix H). Work pace and work standards and procedures are set. Demands for training are relatively more important than those for formal education (Appendix G).

In summary, these occupations all involve an interest in and working with machines, processes, or techniques and involve relatively higher quantitative and spatial than verbal skills. Although apparently requiring higher than average academic aptitudes, these jobs do not make many demands for the specific mental activities measured by the PAQ. Of the two subgroups of occupations in this group, the crafts workers require less of the mental activities than do the other workers (e.g., technicians, radio operators). There is minimal involvement with people. This group is very similar to the moderate academic level Group 16 occupations, which also require high psychomotor but low people aptitudes and most of whom are also craftsmen. It is fairly skilled technical or mechanical work with fixed standards emphasizing quantitative rather than verbal skills but without much responsibility or interpersonal stress. The main difference between the groups is apparently in the general level of academic ability or intelligence required.

These Group 25 occupations employ 1.1% of the labor force (Appendix I).

Group 26: High academic, high psychomotor, moderate people. (E.g., designers, millwrights)

There are only 2 occupations in this group and only one has PAQ data available.

Academic aptitudes, particularly the mathematical ones, are above average for these 2 occupations, and the millwrights (for whom PAQ data are available) require average levels of decision-making, reasoning, planning, and analyzing (Appendix C).

Psychomotor abilities differ somewhat, with finger dexterity and form perception being high for designers but manual dexterity high for millwrights (Appendix D). Both, however, require high spatial aptitude and complex involvement with things. The millwrights are moderate on all motor activities except for controlled manual activities (D1Mi3) and use of tools, machines, and equipment (D1M11) which are high. Demands for exertion or strength are low for designers but moderate to high for millwrights (Appendix F). Although little data are available about the job structure of designers, it appears that their job is differently structured than that of the millwrights. The millwrights have set standards and criteria for their work (Appendix H). In contrast, designers do not have set criteria and instead must rely on more ambiguous criteria to guide their work (i.e., on feelings, ideas, or facts, FIF, or on sensory or judgmental criteria, SJC) and must be interested in creative work (Appendix F).

Dealings with people are moderate, but it is not clear what they consist of; there are no data for the designers and the millwrights do some instructing and rely on oral communications in their work but otherwise appear to have few interpersonal activities (Appendix E). Interpersonal stresses are low (Appendix H).

In summary, although these 2 occupations are similar in general competency levels required in the three major areas, the jobs seem to differ in specific requirements. Both stress complex dealings with things, but the designers have more ambiguous standards and creative jobs than do the millwrights who in turn seem to be more similar to the highly skilled craftsmen in motor activities and job structure.

These 2 occupations employ 0.2% of the labor force (Appendix I).

Group 27: High academic, high psychomotor, high people. (E.g., kindergarten teachers, bank tellers, secretaries)

Four of these occupations are professionals and 4 are clerical workers in the census scheme.

These occupations require high verbal aptitudes (percentiles in the 70's) but only moderate math aptitudes (percentiles in the 50's); this is opposite to the pattern found in the last 2 groups also requiring high academic and motor aptitudes but lower dealings with people (Appendix C). The college coaches and physical education teachers, in particular, require only low math aptitude. Only one of the 4 professional workers, kindergarten teachers, has PAQ data and those data show that this occupation requires high levels of almost all the mental activities (decision making, reasoning, planning, writing, and combining, compiling, and analyzing information). The clerical workers in this group require only low to moderate levels of these activities, though demands for transcribing information are sometimes high. The bank tellers and secretaries also require high clerical aptitude (Appendix F).

Psychomotor demands, particularly for finger dexterity and motor coordination, are high for all occupations except the kindergarten teachers (Appendix D). The clerical workers work at a complex level with things but require little spatial aptitude and form perception whereas the pattern is pretty much reversed for the professional workers. The kindergarten teachers are physically active (D1M10), whereas the secretaries are not, and the professional workers require moderate exertion whereas the clerical workers require little (Appendix F).

When interpersonal activities are considered (Appendix E), the professional and clerical workers are once again split into 2 differing groups. The former generally deal with people at a complex level (e.g., supervising,-instructing, negotiating, mentoring), whereas the latter do not (e.g., speaking - signaling, persuading). The PAQ data for kindergarten teachers versus the clerical workers dramatically confirm this. Correspondingly, kindergarten teachers use information from observing behavior and events (as well as written and oral sources of information) but the tellers and secretaries do not (Appendix F), and the teachers face considerably more interpersonal stresses (Appendix H) and demands for vigilance and responsibility (Appendix G). Interests in social welfare (IMACH) are required of the professionals but interests in business are required of the clerical workers (Appendix F).

Job structure and repetition are generally low to moderate, but the clerical workers do have set limits, tolerances, or standards for their work (Appendix H). The work demands neither an interest in creative nor routine work.

In summary, although these occupations require both high psychomotor skills and dealing with people, the interests required are clearly more people related than they are machines or things oriented. In particular, bank tellers and secretaries use machines and equipment but the interests demanded apparently are for business rather than machines and processes. The professional workers require more mental activities, interpersonal activities, interest in social welfare, and responsibility but less complex involvement with things. Presumably this difference between the subgroups appears despite similar demands for psychomotor skills because the professionals all work with people's bodies, whereas the clerical workers manipulate machines.

These occupations employ 4.1% of the labor force (Appendix I).

Group 28: Very high academic, low psychomotor, low people. (E.g., computer programmers, statisticians, social scientists)

The occupations in the very high academic groups are primarily professional workers in the census scheme; one group also includes a number of managerial and sales workers. Many of the occupations in the high academic stratum did not require college degrees, but most of those in this very high group do require a BA or higher. Most of the workers who provide those degrees, college and university teachers, would be in this very high academic stratum, but data are not available to examine them. Almost all occupations in the 9 very high academic groups require high verbal abilities, generally averaging the 90th percentile or above, and most require high levels of math, education, and training.

Turning back to Group 28 in particular, these 8 occupations generally require high levels of all the mental activities except the more clerical ones of coding and transcribing (Appendix C). The percentiles are in the 80's and 90's, thus placing this group (like most of those to follow) above the previous groups which required lower academic aptitude. Math aptitudes average just about the highest of any of the 34 occupational groups, rivaled only by 3 groups of engineers and scientists (Groups 31, 32, and 34).

Most of these jobs require high clerical and spatial aptitudes, but are very low in psychomotor aptitudes, exertion, and general body movement (D1M10) required (Appendices D and F). Generally, these occupations do not require the use of tools, machines, or equipment (D1M9) except for miscellaneous equipment (D1M14) or even a moderately complex relationship with things.

Dealings with people are few, but of a moderate level of complexity when they occur (Appendix E). Advising and having staff functions are the most frequent interpersonal activities; supervising non-employees is unimportant and there are extremely low dealings with the public (9th percentile). Sociologists (non-academic sociologists) have the most interpersonal activities because they have high demands for persuading, instructing, advising, negotiating, and coordinating (without line management authority); actuaries are at least moderate in demands for all these activities but the other occupations have lower demands. Except for the sociologists, interpersonal stresses are low, though most of these occupations work under at least moderate distractions (Appendix A).

Observation of behavior and events is important only to the sociologists, but written, quantitative, and oral information are important to almost all these occupations. Responsibility for safety is low, responsibility for material assets is moderate and about average, but general responsibility is high (Appendix G). Actuaries, atmospheric and space scientists, and sociologists are considered fairly critical to the performance of their organizations.

Demands for education, training, and experience are high, generally around the 80th to 90th percentiles (Appendix G). Job structure and repetition are low and requirements for an interest in creative work are at the 92nd percentile (though generally still only moderate, Appendices F and H). Time pressures are moderate and the use of measurable or verifiable criteria for the work is high, both around the 85th percentile. High interests in science rather than business and in esteem rather than productive satisfaction are required.

In summary, these occupations are very mathematical and sedentary relative to other groups, and they require few physical or interpersonal activities. To the extent that machines are used, they are probably used to further more mental and analytical tasks. With the exception of the sociologists, people seem to be dealt with only to get information from or to pass advice to (particularly to superiors within the organization). This group is more scientific and intellectually demanding than any of those yet examined--and most of those yet to be examined.

This group employs 0.3% of the labor force (Appendix I).

Group 29: Very high academic, low psychomotor, moderate people. (E.g., accountants, operations and systems analysts, economists)

Like the previous group, this one generally requires high levels of the higher-level mental activities (Appendix C) as well as the same sources of information (written, quantitative, and oral, Appendix F). Demands for psychomotor aptitudes are even lower, however, rivaling only Group 30 for the absence of such demands (percentiles ranging from lows of 1 and 2, Appendix D). Many of the motor activities are at a moderate level, though often below average. Like the previous group, exertion is very low (Appendix F). This group deals more often with people than the previous group, but the level of specific interpersonal activities appears to be about the same. Interests and working conditions are also the same as the previous group.

In summary, this group is very similar to the previous one except that it is even lower in motor aptitudes and abilities, but deals with people more often but not in a substantially different manner.

These occupations employ 1.1% of the work force (Appendix I).

Group 30: Very high academic, low psychomotor, high people. (E.g., lawyers, psychologists, managers, and administrators)

This group includes 13 professionals, 10 managers, 3 salesmen, and 1 clerical worker.

Most mental activities as well as academic abilities are around the 90th percentile, almost all the occupations having high demands (Appendix C). Written and oral sources of information are very important, but quantitative materials and observing behavior are less so (Appendix F). Observing events is generally unimportant. Dealings with people are also high and most interpersonal activities range from moderate to high in importance (Appendix E). Coordinating and supervising non-employees are not particularly important in these occupations, but persuading, instructing, advising, and negotiating often are. For judges, clergymen, assessors and controllers, health administrators, insurance agents, real estate agents, and stock and bond salesmen, at least 3 of these 4 activities are very important. The first 3 of these occupations--judges, clergymen, and assessors and controllers--also suffer considerable stress on the job, with the judges and clergymen having high civic obligations and personal sacrifices required (Appendix A). Almost all the occupations in this group, however, have high general responsibility (but low responsibility for safety) and are considered critical to the performance of their organizations (Appendix G). All require high levels of education, training, and related job experience.

As with the previous group, Group 30 occupations require very little psychomotor aptitude or physical exertion (Appendices D and F). The specific motor activities generally range from low to moderate in importance, with the controlled or controlling activities being more important than general handling and body movement.

Almost all these occupations require an interest in data and people versus things and objects and in esteem rather than productive satisfaction (Appendix F). Many of the managerial and sales workers also require an interest in business. Only the lawyers and clergymen appear to require an interest in creative versus routine work, even though the PAQ data show that all these occupations are almost always loosely structured and not repetitious or with a set work pace (Appendix H). In fact, the work in this group is less structured on the average than that of any other occupational group. Time pressures are at least moderate for all the occupations, the group average being at the 78th percentile for all groups.

In summary, Group 30 is like the other 2 very-high-academic-ability and low-psychomotor-ability groups (Groups 28 and 29) in its very high academic and mental but very low motor requirements. This group differs most from the other 2 because of its extensive interpersonal activities, stresses, and responsibilities, but also because it is less oriented to science and quantitative materials.

These occupations employ a relatively large 9.0% of the work force (Appendix I).

Group 31: Very high academic, moderate psychomotor, low people.
(E.g., chemical engineers, civil engineers, mathematical technicians)

There are only 4 occupations in this group, 3 engineers and one technician.

This group is one of those with extremely high requirements for math aptitude (Appendix C). Demands for the mental activities are high for the engineers but only moderate for the technicians. Demands for spatial aptitude and form perception are also quite high with percentiles around 90 (Appendix D). The other psychomotor aptitudes are only moderate, however, the engineering work is considered quite skilled technical work (D1M12). Other motor activities are generally moderate, but little general body movement (D1M10) or exertion is required (Appendices D and F).

The mathematical technicians have only low demands for all the interpersonal activities, but the engineers do considerable advising (Appendix E). The engineers' dealings with people are apparently not very frequent, but they involve a moderate level of all the interpersonal activities when they do occur. Interpersonal stresses are above average, but still low (Appendix H). The most important stresses seem to be working in distracting and frustrating situations. The engineers have high general responsibility (Appendix G).

All 4 jobs require an interest in science (Appendix F). The jobs are loosely structured and not repetitious, but they all have high use of set limits, tolerances, and standards (STS) and measurable or verifiable criteria for their activities (Appendix H).

In summary, these jobs share the high demands for academic aptitudes, mental activities, and education and training of the last 3 groups examined, but they are more similar to those requiring high quantitative rather than high people skills and they involve definitely higher psychomotor aptitudes. They are similar to some of the lower academic level crafts and technical worker groups (Groups 16 and 25) in having such set standards and criteria for work, but the Group 31 jobs are much less structured and more scientific.

These occupations employ 0.4% of the labor force (Appendix I).

Group 32: Very high academic, moderate psychomotor, moderate people. (E.g., architects, industrial engineers, geologists)

Most of these 12 occupations are engineers or physical scientists, all professionals in the census scheme.

Like the previous group, also composed primarily of engineers, this one requires very high math aptitude as well as verbal aptitude (Appendix C). Mental and motor activities, psychomotor aptitudes, strength, interpersonal stresses, general responsibilities, and education and training are also similar. The differences between these 2 groups are few. Group 32 involves more frequent dealings with people, though the activities themselves are largely the same (mostly moderate in level). There tends to be more responsibility for materials, but less set standards for carrying out work. The engineers in this group also require more of an interest in machines and processes than do those in Group 31.

In summary, this is another group distinguished by its high level scientifically and quantitatively oriented demands, but it has more interpersonal activities than some of the others and few set procedures for performing work.

This group employs 1.4% of the labor force (Appendix I).

Group 33: Very high academic, moderate psychomotor, high people. (E.g., sales engineers, registered nurses, secondary school teachers)

PAQ data are not available for 2 of these 5 professional occupations, 3 of which are health related.

These occupations require high verbal abilities but perhaps only moderate mathematical ones (Appendix C). However, the demands for mental activities are lower for secondary teachers than for the nurses and physical therapists. Motor activities are more similar and are generally moderate (Appendix D). In contrast to the other workers (with moderate demands), the teachers require only low finger and manual dexterity. (Most teachers are, in fact, in Group 30 which is the same in general academic competencies and dealings with people but which has lower psychomotor demands.)

These occupations have frequent dealings with people, with instructing and advising being the most important activities (though data are available only for the nurses, therapists, and teachers, Appendix E), and all three occupations have moderate demands for supervising non-employees. None of the 3 deal with the public (D1M21). Once again, the teachers have lower demands. The nurses and therapists also have high general responsibility and are considered critical to the performance of their organizations, but this is not the case with teachers (Appendix G).

This group exceeds all others in the importance of observing behavior, but oral and written sources of information are also important (Appendix F). As a group, interpersonal stresses are far above average, though very surprisingly they are all rated low for the secondary teachers (Appendix H). The work pace is not set nor the work repetitious, but the jobs are at least moderately structured (at least the 3 for which there are PAQ data). Nurses have the most job structure (high) and time pressure (moderate).

The interests required vary from job to job (Appendix F). Sales engineers require an interest in data and people rather than things and objects (but not an interest in science and machines in contrast to many of the engineers in Group 32). Nurses require an interest in science and social welfare (IMACH); therapists in social welfare only; college health specialties teachers in data and people versus things, science versus business, and esteem versus productive satisfaction; and secondary teachers in data and people versus things, social welfare versus machines, and esteem versus productive satisfaction.

In summary, only the health workers and teachers in this group can be well described because the other 2 do not have PAQ data. But the group seems fairly similar on the whole to Group 30 which also has high involvement with people but lower psychomotor aptitudes and less job structure. Teachers differ from the health workers in Group 33 by having fewer demands for interpersonal and mental activities and less responsibility.

These jobs employ 2.6% of the work force (Appendix I).

Group 34: Very high academic, high psychomotor, low people. (E.g., biological scientists, veterinarians, pharmacists)

These 9 occupations are all professional workers in the census scheme.

This is the last of the 4 groups with very high math as well as verbal aptitude (Appendix C). This group, however, has lower demands for the mental activities on the average than did the 3 other groups (percentiles around 70 rather than 80 to 90). This difference seems to occur because only the metallurgical engineers, agricultural scientists, and biological scientists have high demands for any of the higher level activities (e.g., deciding, reasoning, planning).

Like the other 3 high-math groups mentioned above, occupations in this group generally require high spatial aptitude and form perception, but they more uniformly require complex involvement with things (Appendix D). The hand-related psychomotor aptitudes (finger dexterity, manual dexterity, and motor coordination) are especially high for agricultural scientists, veterinarians, clinical lab technicians, and draftsmen. Most of the jobs are highly skilled technical work (D1M12) involving moderate but below average strength (Appendices D and F). Specific motor activities vary considerably from job to job, for example, some requiring much general body movement (metallurgical engineers and pharmacists) but others not (clinical lab technicians and draftsmen) and some requiring considerable handling (agricultural scientists and clinical lab technicians, but others not (metallurgical engineers and marine scientists). Responsibilities also vary (Appendix G). For example, agricultural scientists, clinical lab technicians, and pharmacists are rated as most critical to their organizations but they are, respectively, low, moderate, and high in responsibility for the safety of others.

These occupations do not have many dealings with people, and half of them have dealings of only low complexity (Appendix E). These workers do not persuade, negotiate, coordinate, or supervise non-employees. They do moderate instructing and advising, but they do not have staff functions. The pharmacists require business interests, but all the others require an interest in science (Appendix F). Half of the occupations also require an interest in machines, processes, and techniques versus social welfare.

Only the metallurgical engineers require an interest in creative work and all but these engineers and the agricultural scientists have moderately structured work (Appendices F and H). Time pressures are moderate and standards and criteria for work (STS, MVC) are set. Interpersonal stresses are average but low.

In summary, these jobs require high verbal, math, and psychomotor abilities. Although the work is generally technical, scientific, and skilled, the specific motor activities vary from job to job. Like many groups requiring high psychomotor but low people skills, work standards and criteria are clear. Responsibilities vary from high to low.

These occupations employ 0.8% of the work force (Appendix I).

Group 35: Very high academic, high psychomotor, moderate people. (E.g., health practitioners, n.e.c., airplane pilots, musicians and composers).

Although all 3 occupations are professional workers (only the last 2 of which have PAQ data), they form a seemingly heterogeneous group.

The airplane pilots require high levels of decision making, reasoning, planning, and combining and analyzing information, but the musicians and composers usually require little of these activities despite the high academic aptitudes required (Appendix C). The latter only do a lot of coding. These occupations are above average but generally only moderate in the hand-related psychomotor aptitudes required (Appendix D). Both pilots and musicians, however, require considerable body movement (D1M10) and general physical coordination (e.g., limb movement without visual control, D1M16). The pattern of motor activities is distinctive in this group because it requires more general body movement and coordination than any other group, but less handling (D1M15) and controlled manual activities (D1M13) than any other group.

Dealings with people are at a moderate level of complexity, with the pilots having more interpersonal activities (Appendix E). Musicians do some instructing and a lot of entertaining, but pilots have moderate demands for most of the interpersonal activities. Pilots work under highly distracting circumstances in contrast to the musicians who face only moderate distraction (Appendix H). The musicians face none of the interpersonal stresses but pilots do. The interests demanded are in machines (for pilots) and in things versus data or people (for musicians, Appendix F). Only the health practitioners are interested in social welfare versus machines.

Musicians need an interest in creative work and their work is unstructured except for having a set work pace and cycled activities

(Appendices F and H). In contrast, pilots have highly structured work with set limits, tolerances, and standards as well as measurable criteria for their work.

In summary, only 2 of the occupations in this group can be well-described and it is apparent that, although general competencies may be the same, specific activities and job conditions are extremely different. Pilots have very responsible jobs with clear standards and high job structure, whereas musicians have only loosely structured jobs with low demands for most of the mental and interpersonal demands measured here. Both occupations are similar, however, in their very high demands for general body movement and coordination but very low demands for handling and controlled manual activities.

This group employs 0.2% of the work force (Appendix I).

Group 36: Very high academic, high psychomotor, high people. (E.g., dentists, physicians, radiological technicians)

These 5 professional occupations are all health related. PAQ data are available only for the physicians and radiological technicians. These jobs can be considered the most generally demanding because they make high demands on all the 3 general competency dimensions.

The physicians require high levels of all the mental activities except the most clerically-related ones; the radiological technicians generally require only moderate levels of these activities (Appendix C).

Demands for psychomotor aptitudes are higher in this group than in any other, the percentiles generally being in the high 90's (Appendix D). Specific motor activities vary, with physicians being high on skilled technical work (D1M12) and moderate on most the other activities, whereas the technicians are high on handling (D1M15) and the use of tools, machines, and equipment (D1M9, D1M14). Exertion is moderate for all occupations in this group (Appendix F).

Dentists, physicians, and optometrists deal with people at a higher level of complexity than do the dental hygenists or radiological technicians (Appendix E). The technicians have low demands for most of the interpersonal activities, their interactions presumably being standardized. Physicians, however, have at least moderate interpersonal demands and often high ones (i.e., for persuading, instructing, advising, and supervising non-employees). Sources of information are quite similar for the 2 occupations: high levels of written, pictorial, and oral information and at least moderate levels of quantitative and behavioral information (Appendix F). Physicians must exercise much vigilance and have considerable responsibility, but radiological technicians do not (Appendix F). Both require considerable education, training, and licenses.

All occupations in this group require an interest in science and all but dental hygienists require an interest in social welfare (Appendix F). The physicians must make personal sacrifices and they face moderate levels of all the personally stressful job conditions (Appendix H). The radiological technicians experience strained and conflict-ridden personal contacts. Job structure, time pressure, and repetition are at least moderate for these 2 occupations.

In summary, these occupations make high demands for all the general competencies, though specific activities vary. Although PAQ data are available for only 2 occupations, the 5 occupations probably break down into a more demanding and a less demanding subgroup (physicians, dentists, and perhaps optometrists versus dental hygienists and radiological technicians). If physicians and technicians are a guide, the first group faces considerable demands for most mental and interpersonal activities as well as considerable responsibility and stress, whereas the second subgroup does not. Group 36 as a whole is composed of scientific health-related jobs requiring higher psychomotor aptitudes than any other occupational group.

This group employs 0.6% of the work force (Appendix I).

Appendix C

Census Occupational Codes by which DOT and PAQ Data were Aggregated for the Skills Map

This appendix includes the number of titles aggregated for each census category and the Skills Map aptitude group number each census category was assigned.

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No.
	PROFESSIONAL, TECHNICAL, AND KINDRED WORKERS				
001	Accountants	11	8	352	29
002	Architects	4	2	10	32
	Computer specialists				
003	Computer programmers	4	2	134	28
004	Computer systems analysts	3	2	77	20
005	Computer specialists, n.e.c.	1	-	-	28
	Engineers				
006	Aeronautical and astronautical engineers	12	-	-	31
010	Chemical engineers	8	1	26	31
011	Civil engineers	15	6	106	31
012	Electrical and electronic engineers	33	11	218	32
013	Industrial engineers	20	9	86	32
014	Mechanical engineers	12	3	20	32
015	Metallurgical and materials engineers	5	2	5	34
020	Mining engineers	2	1	8	32
021	Petroleum engineers	6	-	-	32
022	Sales engineers	6	-	-	33
023	Engineers, n.e.c.	30	2	18	32
024	Farm management advisors	7	3	79	21
025	Foresters and conservationists	21	4	8	21
026	Home management advisors	3	2	63	24
	Lawyers and judges				
030	Judges	3	1	1	30
031	Lawyers	17	8	91	30
	Librarians, archivists, and curators				
032	Librarians	17	9	75	20
033	Archivists and curators	7	-	-	32
	Mathematical specialists				
034	Actuaries	1	1	16	28
035	Mathematicians	3	-	-	28
036	Statisticians	3	1	18	28
	Life and physical scientists				
042	Agricultural scientists	13	2	7	34
043	Atmospheric and space scientists	1	3	1	28
044	Biological scientists	16	2	13	34
045	Chemists	9	4	27	32
051	Geologists	14	1	20	32
052	Marine Scientists	3	2	6	34
053	Physicists and astonomers	7	-	-	32
054	Life and physical scientists, n.e.c.	1	-	-	34
055	Operations and systems researchers and analysts	13	7	97	29
056	Personnel and labor relations workers	29	12	386	30

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No.
	Physicians, dentists, and related practitioners				
061	Chiropractors	2	-	-	27
062	Dentists	8	-	-	36
063	Optometrists	1	-	-	36
064	Pharmacists	1	1	4	34
065	Physicians, medical and osteopathic	28	4	6	36
071	Podiatrists	2	-	-	15
072	Veterinarians	13	-	-	34
073	Health practitioners, n.e.c.	3	-	-	35
	Nurses, dietitians and therapists				
074	Dietitians	9	27	4	21
075	Registered nurses	15	57	11	33
076	Therapists	17	4	18	33
	Health technologists and technicians				
080	Clinical laboratory technologists and technicians	8	3	19	34
081	Dental hygienists	1	-	-	36
082	Health record technologists and technicians	2	1	2	30
083	Radiologic technologists and technicians	3	1	2	36
084	Therapy assistants	3	-	-	27
085	Health technologists and technicians, n.e.c.	24	9	49	24
	Religious workers				
086	Clergymen	1	1	1	30
090	Religious workers, n.e.c.	7	-	-	21
	Social scientists				
091	Economists	4	5	60	29
092	Political scientists	1	-	-	19
093	Psychologists	10	7	40	30
094	Sociologists	1	1	3	28
095	Urban and regional planners	2	2	24	32
096	Social scientists, n.e.c.	12	2	23	28
	Social and recreation workers				
100	Social workers	23	13	113	21
101	Recreation workers	10	5	49	21
	Teachers, college and university				
102	Agriculture teachers	1	-	-	30
103	Atmospheric, earth, marine, and space teachers	-	-	-	-
104	Biology teachers	-	-	-	-
105	Chemistry teachers	-	-	-	-
110	Physics teachers	-	-	-	-
111	Engineering teachers	-	-	-	-
112	Mathematics teachers	-	-	-	-
113	Health specialties teachers	2	-	-	33
114	Psychology teachers	-	-	-	-
115	Business and commerce teachers	-	-	-	-
116	Economics teachers	-	-	-	-

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
120	History teachers	-	-	-	-
121	Sociology teachers	-	-	-	-
122	Social science teachers, n.e.c.	-	-	-	-
123	Art, drama, and music teachers	5	-	-	24
124	Coaches and physical education teachers	3	-	-	27
125	Education teachers	-	-	-	-
126	English teachers	-	-	-	-
130	Foreign language teachers	-	-	-	-
131	Home economics teachers	-	-	-	-
132	Law teachers	-	-	-	-
133	Theology teachers	-	-	-	-
134	Trade, industrial, and technical teachers	-	-	-	-
135	Miscellaneous teachers, college and university	1	-	-	21
140	Teachers, college and university, subject not specified	3	2	15	30
	Teachers, except college and university				
141	Adult education teachers	4	3	29	24
142	Elementary school teachers	2	2	53	21
143	Prekindergarten and kindergarten teachers	2	1	9	27
144	Secondary school teachers	4	2	9	33
145	Teachers, except college and university, n.e.c.	15	1	2	24
	Engineering and science technicians				
150	Agriculture and biological technicians, except health	13	2	22	13
151	Chemical technicians	8	1	49	22
152	Draftsmen	47	19	379	34
153	Electrical and electronic engineering technicians	32	5	109	25
154	Industrial engineering technicians	7	5	41	23
155	Mechanical engineering technicians	5	3	46	25
156	Mathematical technicians	2	1	4	31
161	Surveyors	11	2	7	22
162	Engineering and science technicians, n.e.c.	64	13	204	22
	Technicians, except health, and engineering and science				
163	Airplane pilots	17	9	41	35
164	Air traffic controllers	6	5	9	23
165	Embalmers	2	-	-	25
170	Flight engineers	-	1	3	-
171	Radio operators	13	2	29	25
172	Tool programmers, numerical control	1	1	1	19
173	Technicians, n.e.c.	21	-	-	23
174	Vocational and educational counselors	7	5	78	30
	Writers, artists, and entertainers				
175	Actors	10	-	-	12

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No.
180	Athletes and kindred workers	29	3	8	14
181	Authors	11	-	-	19
182	Dancers	2	-	-	23
183	Designers	26	-	-	26
184	Editors and reporters	31	8	45	30
185	Musicians and composers	8	1	1	35
190	Painters and sculptors	41	5	30	16
191	Photographers	15	3	6	23
192	Public relations men and publicity writers	3	1	36	30
193	Radio and television announcers	2	-	-	21
194	Writers, artists, and entertainers, n.e.c.	35	2	22	15
195	Research workers, not specified	3	1	5	30
	MANAGERS AND ADMINISTRATORS, EXCEPT FARM				
201	Assessors, controllers, and teasurers; local public administration	4	1	25	30
202	Bank officers and financial managers	18	10	129	30
203	Buyers and shippers, farm products	9	-	-	30
205	Buyers, wholesale and retail trade	1	2	21	21
210	Credit men	1	1	35	30
211	Funeral directors	1	-	-	21
212	Health administrators	16	3	14	30
213	Construction inspectors, public administration	5	3	47	20
215	Inspectors, except construction, public aministration	31	2	7	20
216	Managers and superintendents, building	3	2	32	21
220	Office managers, n.e.c.	2	2	92	21
221	Officers, pilots, and pursers; ship	15	-	-	24
222	Officials and administrators; public administration, n.e.c.	86	22	154	30
223	Officials of lodges, societies, and unions	13	4	19	21
224	Postmasters and mail superintendents	2	1	4	21
225	Purchasing agents and buyers, n.e.c.	8	4	150	30
226	Railroad conductors	6	1	1	12
230	Restaurant, cafeteria, and bar managers	8	2	38	21
231	Sales managers and department heads, retail trade	4	3	48	21
233	Sales managers, except retail trade	3	1	1	21
235	School administrators, college	17	7	14	30
240	School administrators, elementary and secondary	9	5	24	30
245	Managers and administrators, n.e.c.	263	46	1264	30

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
	SALES WORKERS				
260	Advertising agents and salesmen	5	2	6	21
261	Auctioneers	1	1	1	21
262	Demonstrators	5	-	-	15
264	Hucksters and peddlers	7	1	1	12
265	Insurance agents, brokers, and underwriters	7	4	273	30
266	Newsboys	1	-	-	12
270	Real estate agents and brokers	8	2	9	30
271	Stock and bond salesmen	3	1	4	30
280	Salesmen and sales clerks, n.e.c. Category "280 Salesmen and sales clerks, n.e.c." was subdivided in the Census into 5 occupation groups dependent on industry. The industry codes are shown in parentheses. Code 280 not used here because redundant with codes 281 - 285.				
281	Sales representatives, manufacturing industries (Ind. 107-399) Durable, nondurable	13	-	-	21
282	Sales representatives, wholesale trade (Ind. 017-058, 507-599) agric., mining, wholesale trade	77	12	63	21
283	Sales clerks, retail trade (Ind. 608-699 except 618, 639, 649, 667, 668, 688) except auto, furniture	51	10	58	15
284	Salesmen, retail trade (Ind. 607, 618, 639, 649, 667 668, 688) auto, furniture, appliance fuel	10	2	3	15
285	Salesmen of services and construction (Ind. 067-078, 407-499, 707-947)	35	5	68	21
	CLERICAL AND KINDRED WORKERS				
301	Bank tellers	8	3	54	27
303	Billing clerks	8	5	179	13
305	Bookkeepers	22	14	1083	22
310	Cashiers	20	6	144	24
311	Clerical assistants, social welfare	1	-	-	18
312	Clerical supervisors, n.e.c.	37	20	188	21
313	Collectors, bill and account	7	2	52	12
314	Counter clerks, except food	15	2	67	12
315	Dispatchers and starters, vehicle	20	8	77	12
320	Enumerators and interviewers	3	1	1	12
321	Estimators and investigators, n.e.c.	46	18	259	20
323	Expediters and production controllers	55	11	244	11
325	File clerks	13	5	305	14
326	Insurance adjusters, examiners, and investigators	3	4	227	21
330	Library attendants and assistants	10	5	113	11
331	Mail carriers, post office	4	1	3	14

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
332	Mail handlers, except post office	11	1	107	11
333	Messengers and office boys	9	2	46	5
334	Meter readers, utilities	3	3	149	21
	Office machine operators				
341	Bookkeeping and billing machine operators	6	5	68	25
342	Calculating machine operators	5	4	72	13
343	Computer and peripheral equipment operators	5	5	194	13
344	Duplicating machine operators	6	4	56	4
345	Key punch operators	3	3	315	13
350	Tabulating machine operators	3	1	16	13
355	Office machine operators, n.e.c.	24	6	74	4
360	Payroll and timekeeping clerks	6	3	135	23
361	Postal clerks	1	1	23	7
362	Proofreaders	6	4	65	10
363	Real estate appraisers	1	1	33	30
364	Receptionists	14	8	183	12
	Secretaries				
370	Secretaries, legal	1	1	24	27
371	Secretaries, medical	1	1	4	27
372	Secretaries, n.e.c.	3	3	890	27
374	Shipping and receiving clerks	23	10	303	13
375	Statistical clerks	45	15	309	13
376	Stenographers	6	2	322	17
381	Stock clerks and storekeepers	36	15	562	11
382	Teacher aides, exc. school monitors	4	3	42	24
383	Telegraph messengers	-	-	-	-
384	Telegraph operators	8	-	-	15
385	Telephone operators	10	6	127	15
390	Ticket, station, and express agents	25	7	56	21
391	Typists	14	10	766	16
392	Weighers	23	4	75	4
394	Miscellaneous clerical workers	157	41	1589	14
395	Not specified clerical workers	11	-	-	11
	CRAFTSMEN AND KINDRED WORKERS				
401	Automobile accessories installers	8	-	-	4
402	Bakers	18	1	3	4
403	Blacksmiths	4	1	8	4
404	Boilermakers	7	5	50	14
405	Bookbinders	11	-	-	4
410	Brickmasons and stonemasons	21	1	19	13
411	Brickmasons and stonemasons, apprentices	4	1	19	17

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
412	Bulldozer operators	5	4	18	4
413	Cabinetmakers	5	-	-	16
415	Carpenters	38	3	143	13
416	Carpenter apprentices	4	-	-	25
420	Carpet installers	1	-	-	25
421	Cement and concrete finishers	13	3	26	4
422	Compositors and typesetters	17	1	9	13
423	Printing trades apprentices, exc. pressmen	14	-	-	16
424	Cranemen, derrickmen, and hoistmen	49	5	64	4
425	Decorators and window dressers	3	2	6	25
426	Dental laboratory technicians	14	5	31	16
430	Electricians	19	10	512	17
431	Electrician apprentices	4	1	11	16
433	Electric power linemen and cablemen	26	10	360	14
434	Electrotypers and stereotypers	4	1	1	14
435	Engravers, exc. photoengravers	41	3	9	4
436	Excavating, grading, and road machine operators; exc. bulldozer	35	6	133	4
440	Floor layers, exc. tile setters	3	-	-	13
441	Foremen, n.e.c.	733	45	335	15
442	Forgemen and hammermen	16	1	1	4
443	Furniture and wood finishers	4	2	10	2
444	Furriers	6	-	-	7
445	Glaziers	10	1	1	4
446	Heat treaters, annealers, and temperers	18	2	7	4
450	Inspectors, scalers, and graders; log and lumber	13	4	34	4
452	Inspectors, n.e.c.	103	16	232	13
453	Jewelers and watchmakers	48	-	-	7
454	Job and die setters, metal	54	4	15	13
455	Locomotive engineers	2	2	37	4
456	Locomotive firemen	2	-	-	13
461	Machinists	13	7	168	25
462	Machinist apprentices	4	1	3	25
	Mechanics and repairmen				
470	Air conditioning, heating, and refrigeration	13	2	20	13
471	Aircraft	22	3	9	16
472	Automobile body repairmen	9	2	11	13
473	Automobile mechanics	33	5	132	13
474	Automobile mechanic apprentices	1	1	3	16
475	Data processing machine repairmen	-	-	-	-
480	Farm implement	8	3	28	13
481	Heavy equipment mechanics, incl. diesel	81	21	439	16
482	Household appliance and accessory installers and mechanics	20	13	165	13
483	Loom fixers	6	1	4	4

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
484	Office machine	7	2	5	16
485	Radio and television	15	6	57	16
486	Railroad and car shop	22	4	56	13
491	Mechanic, exc. auto, apprentices	10	3	37	25
492	Miscellaneous mechanics and repairmen	206	26	193	13
495	Not specified mechanics and repairmen	7	-	-	4
501	Millers; grain, flour and feed	22	-	-	4
502	Millwrights	3	3	185	26
503	Molders, metal	19	3	4	4
504	Molder apprentices	2	-	-	16
505	Motion picture projectionists	3	-	-	14
506	Opticians, and lens grinders and polishers	32	-	-	13
510	Painters, construction and maintenance	10	3	89	13
511	Painter apprentices	3	-	-	16
512	Paperhangers	-	-	-	-
514	Pattern and model makers, exc. paper	68	1	1	16
515	Photoengravers and lithographers	20	3	11	16
516	Piano and organ tuners and repairmen	13	-	-	13
520	Plasterers	6	1	2	13
521	Plasterer apprentices	1	-	-	13
522	Plumbers and pipe fitters	19	4	138	14
523	Plumber and pipe fitter apprentices	2	1	27	25
525	Power station operators	16	5	123	14
530	Pressmen and plate printers, printing	47	16	102	4
531	Pressman apprentices	8	1	2	13
533	Rollers and finishers, metal	27	1	2	4
534	Roofers and slaters	3	-	-	14
535	Sheetmetal workers and tinsmiths	13	3	45	13
536	Sheetmetal apprentices	1	1	5	25
540	Shipfitters	3	-	-	16
542	Shoe repairmen	10	-	-	7
543	Sign painters and letterers	5	-	-	16
545	Stationary engineers	48	17	318	13
546	Stone cutters and stone carvers	14	-	-	4
550	Structural metal craftsmen	16	5	69	13
551	Tailors	4	-	-	25
552	Telephone installers and repairmen	21	10	86	14
554	Telephone linemen and splicers	6	3	9	14
560	Tile setters	7	-	-	4
561	Tool and die makers	29	11	78	16
562	Tool and die maker apprentices	6	3	18	25
563	Upholsterers	25	1	1	4
571	Specified craft apprentices, n.e.c.	51	6	51	16
572	Not specified apprentices	5	1	17	16
575	Craftsmen and kindred workers, n.e.c.	44	1	7	13
580	Former members of the Armed Forces	-	-	-	-

Occupation Code		No. Dot Titles	No. PAQ Titles	No.PAQ Responses	Aptitude Group No
	OPERATIVES, EXCEPT TRANSPORT				
601	Asbestos and insulation workers	9	1	2	4
602	Assemblers	376	17	144	4
603	Blasters and powdermen	12	-	-	4
604	Bottling and canning operatives	3	2	186	4
605	Chainmen, rodmen, and axmen; surveying	-	2	61	-
610	Checkers, examiners, and inspectors; manufacturing	451	26	223	4
611	Clothing ironers and pressers	41	3	5	4
612	Cutting operatives, n.e.c.	279	19	117	4
613	Dressmakers and seamstresses, except factory	6	-	-	16
614	Drillers, earth	11	-	-	13
615	Dry wall installers and lathers	6	-	-	17
620	Dyers	41	-	-	4
621	Filers, polishers, sanders, and buffers	144	10	37	4
622	Furnacemen, smeltermen, and pourers	74	9	34	4
623	Garage workers and gas station attendants	8	1	1	5
624	Graders and sorters, manufacturing	84	2	19	4
625	Produce graders and packers, except factory and farm	13	2	17	4
626	Heaters, metal	5	-	-	1
630	Laundry and dry cleaning operatives, n.e.c.	55	3	3	4
631	Meat cutters and butchers, exc. manufacturing	6	2	7	7
633	Meat cutters and butchers, manufacturing	49	1	3	4
634	Meat wrappers, retail trade	-	-	-	-
635	Metal platers	10	2	4	13
636	Milliners	3	-	-	4
640	Mine operatives, n.e.c.	102	4	8	4
641	Mixing operatives	194	13	48	4
642	Oilers and greasers,exc, auto	9	1	52	4
643	Packers and wrappers, except meat and produce	68	12	212	4
644	Painters, manufactured articles	73	7	44	4
645	Photographic process workers	50	5	30	13
	Precision machine operatives				
650	Drill press operatives	32	7	91	4
651	Grinding machine operatives	60	16	89	4
652	Lathe and milling machine operatives	85	18	154	4
653	Precision machine operatives, n.e.c.	26	13	78	4
656	Punch and stamping press operatives	35	6	29	4
660	Riveters and fasteners	26	5	16	4
661	Sailors and deckhands	8	-	-	14
662	Sawyers	76	9	30	4
663	Sewers and stitchers	182	4	39	7
664	Shoemaking machine operatives	142	-	-	4
665	Solderers	8	2	9	4
666	Stationary firemen	18	5	85	4

Occu-pation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
	Textile operatives				
670	Carding, lapping, and combing operatives	32	6	19	4
671	Knitters, loopers, and toppers	14	-	-	7
672	Spinners, twisters, and winders	61	8	48	4
673	Weavers	17	3	4	4
674	Textile operatives, n.e.c.	170	7	21	4
680	Welders and flame-cutters	44	8	140	4
681	Winding operatives, n.e.c.	66	8	102	4
690	Machine operatives, miscellaneous specified	1774	173	1302	4
692	Machine operatives, not specified	28	1	37	4
694	Miscellaneous operatives	775	48	411	4
695	Not specified operatives	30	5	112	4
	TRANSPORT EQUIPMENT OPERATIVES				
701	Boatmen and canalmen	6	-	-	5
703	Bus drivers	4	1	1	15
704	Conductors and motormen, urban rail transit	1	-	-	24
705	Deliverymen and routemen	9	2	4	2
706	Fork lift and tow motor operatives	5	1	120	4
710	Motormen; mine, factory, logging camp, etc.	16	1	4	4
711	Parking attendants	2	-	-	3
712	Railroad brakemen	4	2	30	5
713	Railroad switchmen	3	-	-	4
714	Taxicab drivers and chauffeurs	11	3	23	5
715	Truck drivers	17	7	234	4
	LABORERS, EXCEPT FARM				
740	Animal caretakers exc. farm	12	5	28	5
750	Carpenters' helpers	1	-	-	4
751	Construction laborers, exc. carpenters' helpers	16	8	106	4
752	Fishermen and oystermen	30	-	-	4
753	Freight and material handlers	74	19	305	1
754	Garbage collectors	3	-	-	5
755	Gardeners and groundkeepers, exc. farm	14	7	71	4
760	Longshoremen and stevedores	11	1	1	1
761	Lumbermen, raftsmen, and woodchoppers	28	7	22	4
762	Stock handlers	9	3	90	1
763	Teamsters	1	-	-	4
764	Vehicle washers and equipment cleaners	17	5	15	4
770	Warehousemen, n.e.c.	-	-	-	-
780	Miscellaneous laborers	334	18	64	4
785	Not specified laborers	6	1	4	4

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group Nc
	FARMERS AND FARM MANAGERS				
801	Farmers (owners and tenants)	19	1	5	13
802	Farm managers	6	3	5	21
	FARM LABORERS AND FARM FOREMEN				
821	Farm foremen	25	2	17	15
822	Farm laborers, wage workers	59	10	43	4
823	Farm laborers, unpaid family workers	-	-	-	-
824	Farm service laborers, self-employed	4	-	-	14
	SERVICE WORKERS, EXC. PRIVATE HOUSEHOLD				
	Cleaning service workers				
901	Chambermaids and maids, except private household	1	-	-	1
902	Cleaners and charwomen	8	5	180	1
903	Janitors and sextons	5	4	125	4
	Food service workers				
910	Bartenders	3	1	2	11
911	Busboys	3	-	-	3
912	Cooks, except private household	32	6	19	14
913	Dishwashers	2	-	-	1
914	Food counter and fountain workers	8	3	11	6
915	Waiters	15	2	3	15
916	Food service workers, n.e.c., except private household	14	5	94	5
	Health service workers				
921	Dental assistants	2	1	4	14
922	Health aides, exc. nursing	7	2	7	14
923	Health trainees	-	-	-	-
924	Lay midwives	2	-	-	18
925	Nursing aides, orderlies, and attendants	8	6	41	15
926	Practical nurses	3	2	24	15
	Personal service workers				
931	Airline stewardesses	2	2	32	21
932	Attendants, recreation and amusement	44	2	3	12
933	Attendants, personal service, n.e.c.	44	3	10	3
934	Baggage porters and bellhops	7	-	-	3
935	Barbers	2	1	3	18
940	Boarding and lodging house keepers	3	1	1	12
941	Bootblacks	1	-	-	3
942	Child care workers, exc. private household	3	1	3	6
943	Elevator operators	3	1	2	3
944	Hairdressers and cosmetologists	11	1	3	18

Occupation Code		No. Dot Titles	No. PAQ Titles	No. PAQ Responses	Aptitude Group No
945	Personal service apprentices	2	-	-	18
950	Housekeepers, exc. private household	17	1	49	12
952	School monitors	-	-	-	-
953	Ushers, recreation and amusement	2	-	-	2
954	Welfare service aides	-	2	4	-
	Protective service workers				
960	Crossing guards and bridge tenders	8	1	2	2
961	Firemen, fire protection	15	8	291	14
962	Guards and watchmen	20	11	257	12
963	Marshals and constables	-	-	-	-
964	Policemen and detectives	42	25	594	21
965	Sheriffs and bailiffs	11	8	108	12
	PRIVATE HOUSEHOLD WORKERS				
980	Child care workers, private household	4	-	-	3
981	Cooks, private household	2	-	-	11
982	Housekeepers, private household	3	1	27	12
983	Laundresses, private household	2	-	-	1
984	Maids and servants, private household	4	-	-	2

OCCUPATION NOT REPORTED

995 This code is used to identify not reported occupations in surveys where the not reported cases are not allocated.

ALLOCATION CATEGORIES

196	Professional, technical, and kindred workers-allocated
246	Managers and administrators, except farm-allocated
296	Sales workers-allocated
396	Clerical and kindred workers-allocated
586	Craftsmen and kindred workers-allocated
696	Operatives, except transport-allocated
726	Transport equipment operatives-allocated
796	Laborers, except farm-allocated
806	Farmers and farm managers-allocated
846	Farm laborers and farm foremen-allocated
976	Service workers, exc. private household-allocated
986	Private household workers-allocated

These codes were not used

Those returns from the Population Census which do not have an occupation entry are allocated among the major occupation groups during computer processing.

Appendix D

Selected Results from the Gilman Study of Job Requirements for three types of Work and Thirteen Specific Occupations

Tables D-1 through D-14 are based on data described elsewhere (Gottfredson, Finucci, & Childs, 1982)

Table D-1 tests for the significance of differences (for each of 37 worker traits required by jobs) among three major types of work and then between four specific occupations for which there were a substantial number of cases.

Tables D-2 through D-14 present results for 13 specific occupations for which there were five or more cases. The results are organized to show which traits are most critical and least critical in each occupation. The following chart shows to which census category and to which Skills Map Aptitude Group each occupation was assigned.

Occupations Represented in Tables D-2 to D-14

Table No.	Aptitude Group No.	Census Category	(N)[a]	Title
D-2	21	142	(5)	Elementary School Teacher
D-3	30	31	(47)	Lawyer
D-4	30	184	(7)	Editor/reporter
D-5	30	202	(19)	Bank officer
D-6	30	240	(5)	School administrator
D-7	30	245	(14)	Vice president
D-8	30	245	(18)	President/CEO
D-9	30	265	(10)	Insurance agent
D-10	30	271	(10)	Stock and bond salesman
D-11	31,32	006-014,023	(10)	Engineer
D-12	32	002	(6)	Architect
D-13	33	144	(9)	Secondary teacher
D-14	36	065	(35)	Physician

[a] N's sometimes vary slightly from trait to trait in the tables because of missing data.

Table D-1

Percentage of Gilman Men Aged 26-55 Rating 37 Job-Related Abilities or Traits as Critical for Doing their Own Jobs Well: For Major Occupational Groups and Several Specific Occupations

Job-Related Abilities or Traits	Major Occupational Groups				Specific Occupations				
	Professional	Managerial	Sales	Sign. Level	Lawyer	Physician	VP/Pres/CEO	Other Manager	Sign. Level
Get information by talking with people	68	70	61	.659	71	89	58	81	.020
Give information by talking with people	66	63	71	.666	68	81	71	66	.479
Have integrity	62	61	77	.233	71	78	62	53	.134
Get information by reading	61	30	36	.000	77	60	25	34	.000
Think logically and analytically	59	46	38	.026	76	54	38	66	.006
Pay attention to details	53	40	56	.046	73	54	22	47	.000
Be dedicated and conscientious	51	44	59	.224	48	65	45	56	.323
Handle several tasks at one time	51	67	36	.002	58	54	66	66	.696
Have higher degree or credential	45	3	0	.000	69	67	0	0	.000
Plan ahead and anticipate problems	44	53	38	.203	43	51	62	62	.223
Give information by writing reports, memos, etc.	42	29	19	.008	57	32	12	38	.001
Spot and tackle problems quickly	38	48	38	.221	45	51	50	59	.651
Take initiative and responsibility	37	61	31	.000	35	27	58	69	.001
Learn quickly	35	29	19	.175	36	40	31	31	.821
Concentrate in distracting or stressful situations	34	29	25	.408	41	51	22	32	.074
Be fair and impartial	34	30	12	.050	26	22	25	34	.712
Visualize things before completion	32	35	22	.364	31	30	41	50	.240
Coordinate and schedule activities	30	40	41	.221	29	22	25	53	.024
Be persuasive and motivating	26	44	56	.000	45	16	62	41	.001
Think of new approaches to problems	26	32	16	.182	29	22	31	38	.540
Make decisions quickly	25	32	19	.198	18	51	25	41	.007
Evaluate, discipline, praise others	24	46	16	.000	6	16	56	34	.000
Have a good memory	22	17	19	.512	20	30	12	16	.296
Represent company well to the public	22	38	50	.001	23	16	38	34	.152
Have poise	21	25	34	.257	28	22	19	31	.662
Cooperate with co-workers	21	29	12	.087	8	16	22	34	.031
Be tactful and considerate	20	19	31	.325	8	35	16	19	.018
Have a lot of ideas	18	16	28	.270	16	8	16	19	.609
Be competitive	14	23	47	.000	21	11	25	25	.430
Have good contacts	14	18	31	.046	12	11	38	6	.002
Have manual dexterity	10	4	0	.034	0	35	0	6	.000
Be good at math	9	18	10	.063	0	0	19	19	.001
Have physical coordination	6	4	0	.244	0	22	0	9	.000
Follow orders and support company policies	4	12	16	.011	2	0	13	9	.057
Be attractive and well groomed	3	5	22	.000	6	3	9	6	.294
Have attended the right college	3	1	3	.492	2	3	0	0	.662
Have physical strength and endurance	2	6	0	.111	0	5	3	9	.195
(N)	(175)	(114)	(32)		(47)	(37)	(32)	(32)	

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Table D-1 cont.

All percentages ≥ 40 are underlined for major occupational groups; all percentages ≥ 50 are underlined for specific occupations. Professionals include job titles from the 1970 census major group Professional, Technical, and Kindred Workers; managers are job titles from the census major group of Managers and Administrators, except Farm, and from the group Farmers and Farm Managers; salesmen include job titles from the census major group Sales Workers. The specific occupations are also included in the results for the major groups: lawyers and physicians are professionals and the two other titles are from the group of managers. The "other manager" category includes all job titles in 1970 census code 245, excluding vice presidents, presidents, and CEOs. One judge is included with the lawyers, one dentist with the physicians, and 3 farmers with the managers. Significance levels of differences were determined with F-tests.

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Table D-2

Elementary Teacher

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Have integrity	100	0	0
Be fair and impartial	100	0	0
Take initiative and responsibility	100	0	0
Evaluate, discipline, and praise others	80	100	100
Be dedicated and conscientious	80	100	100
Handle several tasks at one time	60	100	100
Plan ahead and anticipate problems	60	100	100
Concentrate in distracting or stressful situations	60	100	100
Be persuasive and motivating	60	100	100
Coordinate and schedule activities	60	100	100
Get information by reading	60	80	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Give information by talking with people	40	100	100
Spot and tackle problems quickly	40	100	100
Have a lot of ideas	40	100	100
Be tactful and considerate	40	100	100
Cooperate with coworkers	40	80	100
Pay attention to details	40	80	100
Get information by talking with people	20	100	100
Learn quickly	20	100	100
Think of new approaches to problems	20	100	100
Think logically and analytically	20	100	100
Have a good memory	20	100	100
Visualize things before completion	20	80	100
Be good at math	0	80	100
Rated at least SOMEWHAT HELPFUL by at least 80% of respondents			
Represent company well to the public	40	40	80
Have poise	20	60	100
Make decisions quickly	20	60	80
Have higher degree or credential	20	40	100
Be attractive and well groomed	20	40	80
Follow orders and support company policies	20	40	80
Give information by writing reports, memos, etc.	20	20	80
Have physical coordination	0	40	100
Have manual dexterity	0	40	80

Table D-2 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Be competitive	20	20	60
Have physical strength and endurance	0	40	60
Have attended the right college	0	20	20
Have good contacts	0	0	60

Table D-3

Lawyer

Trait	% respondents rating trait as:		
	Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Think logically and analytically	77	100	100
Get information by reading	77	96	100
Pay attention to details	72	98	100
Give information by talking with people	70	94	100
Get information by talking with people	70	93	100
Have integrity	70	93	100
Have higher degree or credential	68	80	89
Handle several tasks at one time	60	94	100
Give information by writing reports, memos, etc.	57	92	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Be dedicated and conscientious	49	96	100
Spot and tackle problems quickly	46	94	98
Be persuasive and motivating	46	90	100
Plan ahead and anticipate problems	44	94	98
Concentrate in distracting or stressful situations	40	96	100
Learn quickly	35	100	100
Take initiative and responsibility	35	94	98
Visualize things before completion	31	71	90
Think of new approaches to problems	29	83	98
Coordinate and schedule activities	29	79	98
Have poise	28	89	98
Be fair and impartial	25	67	88
Represent company well to the public	23	68	89
Be tactful and considerate	8	68	100
Have a good memory	21	90	100
Be competitive	21	68	92
Make decisions quickly	17	69	96
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Have a lot of ideas	17	54	98
Have good contacts	12	55	92
Cooperate with coworkers	9	64	98
Be attractive and well groomed	6	50	94
Evaluate, discipline, and praise others	4	40	94

Table D-3 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Follow orders and support company policies	2	35	73
Have attended the right college	2	6	59
Be good at math	0	20	64
Have physical strength and endurance	0	17	44
Have physical coordination	0	0	15
Have manual dexterity	0	0	11

Table D-4

Editor and Reporter

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Get information by talking with people	86	100	100
Pay attention to details	71	100	100
Get information by reading	71	86	100
Have good contacts	71	86	100
Be dedicated and conscientious	67	100	100
Have integrity	57	100	100
Think logically and analytically	57	100	100
Take initiative and responsibility	57	86	100
Give information by writing reports, memos, etc.	57	86	100
Be fair and impartial	57	86	86
Have a good memory	50	67	83
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Learn quickly	43	86	100
Plan ahead and anticipate problems	43	86	100
Have a lot of ideas	43	86	100
Concentrate in distracting or stressful situations	43	71	100
Be competitive	43	71	71
Handle several tasks at one time	29	100	100
Spot and tackle problems quickly	29	86	100
Cooperate with coworkers	29	71	100
Make decisions quickly	29	71	86
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Visualize things before completion	29	57	86
Give information by talking with people	14	57	86
Think of new approaches to problems	14	43	86
Evaluate, discipline, and praise others	14	29	86
Represent company well to the public	0	29	100
Follow orders and support company policies	0	0	86

Table D-4 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents (If not listed above)			
Be persuasive and motivating	14	43	71
Be tactful and considerate	14	29	57
Coordinate and schedule activities	14	29	57
Have poise	0	29	71
Have physical strength and endurance	0	17	33
Have higher degree or credential	0	14	57
Be good at math	0	14	43
Have attended the right college	0	14	29
Have manual dexterity	0	14	29
Be attractive and well groomed	0	0	71
Have physical coordination	0	0	14

Table D-5

Bank Officer

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Get information by talking with people	84	100	100
Have integrity	84	100	100
Give information by talking with people	79	100	100
Handle several tasks at one time	68	100	100
Represent company well to the public	58	90	95
Take initiative and responsibility	53	95	95
Give information by writing reports, memos, etc.	53	90	100
Get information by reading	53	90	95
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Think logically and analytically	42	95	100
Plan ahead and anticipate problems	42	90	100
Spot and tackle problems quickly	37	95	100
Coordinate and schedule activities	37	95	100
Be dedicated and conscientious	37	90	100
Pay attention to details	37	90	100
Evaluate, discipline, and praise others	37	74	84
Be persuasive and motivating	26	100	100
Learn quickly	26	95	100
Be competitive	26	84	95
Concentrate in stressful or distracting situations	22	78	96
Make decisions quickly	21	79	90
Think of new approaches to problems	21	74	90
Have poise	16	100	100
Be tactful and considerate	16	84	100
Cooperate with coworkers	16	74	95
Visualize things before completion	16	74	95
Have a good memory	10	68	95
Have good contacts	5	84	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Be fair and impartial	26	63	94
Be good at math	11	61	100
Have a lot of ideas	10	58	95
Follow orders and support company policies	5	63	95
Be attractive and well groomed	5	42	100

Table D-5 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Have higher degree or credential	0	37	79
Have attended the right college	0	5	63
Have physical strength and endurance	0	5	42
Have physical coordination	0	0	10
Have manual dexterity	0	0	5

Table D-6

School Administrator

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Evaluate, discipline, and praise others	100	100	100
Take initiative and responsibility	100	100	100
Handle several tasks at one time	80	100	100
Get information by talking with people	80	100	100
Give information by talking with people	80	100	100
Have integrity	80	100	100
Plan ahead and anticipate problems	80	100	100
Cooperate with coworkers	80	100	100
Concentrate in distracting or stressful situations	80	100	100
Be persuasive and motivating	80	100	100
Coordinate and schedule activities	80	100	100
Be dedicated and conscientious	60	100	100
Spot and tackle problems quickly	60	100	100
Be fair and impartial	60	80	100
Think logically and analytically	60	80	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Learn quickly	40	100	100
Pay attention to details	40	100	100
Think of new approaches to problems	40	100	100
Have poise	40	100	100
Be tactful and considerate	40	100	100
Make decisions quickly	40	100	100
Have a lot of ideas	40	80	100
Visualize things before completion	40	80	80
Represent company well to the public	20	100	100
Have a good memory	20	100	100
Get information by reading	20	80	100
Be attractive and well groomed	0	80	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Give information by writing reports, memos, etc.	20	60	100
Follow orders and support company policies	20	60	100
Have higher degree or credential	20	60	80
Have good contacts	20	0	80
Be good at math	0	40	100
Be competitive	0	20	80

Table D-6 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Have attended the right college	20	40	60
Have physical strength and endurance	0	60	60
Have physical coordination	0	0	20
Have manual dexterity	0	0	0

Table D-7

Vice President

Trait	% respondents rating trait as:		
	Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Have integrity	71	85	93
Handle several tasks at one time	57	86	100
Evaluate, discipline, and praise others	57	86	100
Be persuasive and motivating	57	86	100
Give information by talking with people	54	77	100
Take initiative and responsibility	50	93	100
Plan ahead and anticipate problems	50	86	100
Rated as VERY HELPFUL or CRITICAL by at least 67% of respondents			
Get information by talking with people	38	92	100
Spot and tackle problems quickly	36	79	100
Visualize things before completion	36	79	93
Be dedicated and conscientious	29	93	100
Represent company well to the public	21	86	100
Have poise	15	69	100
Pay attention to details	14	93	100
Think logically and analytically	14	79	100
Cooperate with coworkers	14	79	93
Coordinate and schedule activities	14	79	86
Be fair and impartial	14	71	93
Be competitive	14	71	93
Make decisions quickly	14	71	93
Think of new approaches to problems	7	86	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Have good contacts	36	65	93
Concentrate in distracting or stressful situations	21	65	86
Learn quickly	21	57	100
Be attractive and well groomed	14	50	86
Have a lot of ideas	14	43	86
Get information by reading	14	35	86
Give information by writing reports, memos, etc.	14	35	88
Be tactful and considerate	7	64	93
Be good at math	7	50	100
Have a good memory	0	57	86

Table D-7 - Cont.

Trait	% respondents rating trait as: Critical	 Very Helpful or Critical	 At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Follow orders and support company policies	15	46	77
Have physical strength and endurance	0	36	65
Have manual dexterity	0	21	42
Have higher degree or credential	0	21	42
Have physical coordination	0	21	35
Have attended the right college	0	0	29

Table D-8

President/CEO

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Give information by talking with people	83	94	100
Get information by talking with people	72	100	100
Plan ahead and anticipate problems	72	100	100
Handle several tasks at one time	72	94	100
Be persuasive and motivating	67	95	100
Take initiative and responsibility	65	100	100
Spot and tackle problems quickly	61	94	100
Be dedicated and conscientious	59	94	100
Think logically and analytically	56	100	100
Have integrity	56	89	100
Evaluate, discipline, and praise others	56	89	100
Represent company well to the public	50	89	100
Think of new approaches to problems	50	83	94
Rated as VERY HELPFUL or CRITICAL by at least 67% of respondents			
Visualize things before completion	44	89	100
Learn quickly	39	94	100
Have good contacts	39	72	100
Coordinate and schedule activities	33	94	100
Be fair and impartial	33	89	94
Be competitive	33	89	94
Make decisions quickly	33	83	100
Get information by reading	33	67	100
Be good at math	28	67	100
Pay attention to details	28	100	100
Cooperate with coworkers	28	72	89
Have a good memory	22	100	100
Concentrate in distracting or stressful situations	22	83	94
Be tactful and considerate	22	72	89
Have poise	26	67	94
Have a lot of ideas	17	72	83
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Follow orders and support company policies	11	55	83
Give information by writing reports, memos, etc.	11	50	89

Table D-8 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Be attractive and well groomed	6	44	72
Have physical strength and endurance	6	28	78
Have manual dexterity	0	17	67
Have higher degree or credential	0	6	56
Have attended the right college	0	6	33
Have physical coordination	0	0	61

Table D-9

Insurance Agent

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Have integrity	90	100	100
Give information by talking with people	60	100	100
Get information by talking with people	50	100	100
Pay attention to details	50	100	100
Be dedicated and conscientious	50	80	100
Represent company well to the public	50	70	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Be persuasive and motivating	40	90	100
Plan ahead and anticipate problems	40	70	100
Think logically and analytically	30	90	100
Be competitive	30	80	100
Coordinate and schedule activities	30	80	100
Have poise	20	100	100
Get information by reading	20	90	100
Be tactful and considerate	20	90	100
Be fair and impartial	20	80	90
Spot and tackle problems quickly	20	70	90
Visualize things before completion	20	70	90
Be attractive and well groomed	20	70	90
Cooperate with coworkers	10	90	100
Learn quickly	10	80	100
Take initiative and responsibility	10	80	100
Have a good memory	0	80	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Give information by writing reports, memos, etc.	20	60	90
Think of new approaches to problems	10	60	100
Follow orders and support company policies	10	60	100
Concentrate in distracting or stressful situations	10	60	80
Evaluate, discipline, and praise others	10	50	80
Make decisions quickly	10	40	90
Have good contacts	10	40	80
Have a lot of ideas	10	40	80
Be good at math	0	60	100
Handle several tasks at one time	0	60	80

Table D-9 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Have higher degree or credential	0	10	70
Have physical strength and endurance	0	10	30
Have attended the right college	0	0	30
Have physical coordination	0	0	22
Have manual dexterity	0	0	20

Table D-10

Stock and Bond Salesman

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Give information by talking with people	100	100	100
Get information by talking with people	89	100	100
Have integrity	89	100	100
Be dedicated and conscientious	80	100	100
Get information by reading	78	78	100
Be competitive	70	90	100
Have poise	70	90	100
Handle several tasks at one time	67	78	100
Spot and tackle problems quickly	60	100	100
Think logically and analytically	60	100	100
Have a lot of ideas	60	100	100
Pay attention to details	60	90	100
Concentrate in distracting or stressful situations	60	80	100
Have good contacts	50	100	100
Plan ahead and anticipate problems	50	100	100
Take initiative and responsibility	50	100	100
Represent company well to the public	50	90	100
Have a good memory	50	90	100
Make decisions quickly	50	90	100
Coordinate and schedule activities	50	90	100
Be persuasive and motivating	50	90	90
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Learn quickly	44	100	100
Be tactful and considerate	40	100	100
Think of new approaches to problems	30	90	100
Be attractive and well groomed	30	80	100
Visualize things before completion	30	70	100
Be good at math	22	89	100
Cooperate with coworkers	10	80	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Follow orders and company policies	20	50	80
Evaluate, discipline, and praise others	10	40	80
Give information by writing reports, memos, etc.	10	30	90
Be fair and impartial	0	60	100

Table D-10 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Have attended the right college	0	30	60
Have higher degree or credential	0	10	70
Have physical coordination	0	10	30
Have physical strength and endurance	0	0	30
Have manual dexterity	0	0	20

Table D-11

Engineer

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Think logically and analytically	70	100	100
Give information by talking with people	60	90	100
Give information by writing reports, memos, etc.	60	90	100
Coordinate and schedule activities	60	90	100
Get information by talking with people	50	100	100
Plan ahead and anticipate problems	50	90	100
Pay attention to details	50	90	100
Rated as VERY HELPFUL or CRITICAL by at least 67% of respondents			
Visualize things before completion	40	100	100
Handle several tasks at one time	40	90	100
Think of new approaches to problems	40	90	100
Learn quickly	30	90	100
Cooperate with coworkers	30	90	100
Be good at math	30	80	100
Evaluate, discipline, and praise others	30	70	100
Take initiative and responsibility	30	70	100
Spot and tackle problems quickly	20	90	100
Be persuasive and motivating	20	90	100
Have integrity	20	80	100
Get information by reading	10	90	100
Have a lot of ideas	10	70	100
Be dedicated and conscientious	0	90	100
Rated as at least SOMEWHAT HELPFUL by a least 80% of respondents			
Be fair and impartial	30	60	90
Be tactful and considerate	10	50	90
Have good contacts	10	40	90
Be competitive	10	40	80
Have poise	0	60	90
Make decisions quickly	0	50	100
Concentrate in distracting or stressful situations	0	50	90
Have a good memory	0	50	80
Follow orders and support company policies	0	40	80

Table D-11 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Represent company well to the public	10	40	70
Have higher degree or credential	0	30	60
Be attractive and well groomed	0	11	56
Have manual dexterity	0	10	20
Have physical strength and endurance	0	10	20
Have physical coordination	0	0	30
Have attended the right college	0	0	20

Table D-12

Architect

Trait	% respondents rating trait as:		
	Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Pay attention to details	83	100	100
Get information by talking with people	67	100	100
Visualize things before completion	67	100	100
Plan ahead and anticipate problems	67	83	100
Handle several tasks at one time	50	100	100
Think logically and analytically	50	100	100
Coordinate and schedule activities	50	83	100
Evaluate, discipline, and praise others	50	67	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Give information by talking with people	33	100	100
Be dedicated and conscientious	33	100	100
Take initiative and responsibility	33	83	100
Get information by reading	33	67	100
Think of new approaches to problems	33	67	100
Have a lot of ideas	33	67	100
Have poise	33	67	83
Learn quickly	17	100	100
Have good contacts	17	83	100
Spot and tackle problems quickly	17	83	100
Have integrity	17	67	100
Have a good memory	17	67	100
Be persuasive and motivating	17	67	100
Give information by writing reports, memos, etc.	17	67	83
Rated as at least SOMEWHAT HELPFUL by at least 80 % of respondents			
Represent company well to the public	33	50	100
Make decisions quickly	17	50	100
Be good at math	17	50	83
Be competitive	17	50	83
Have higher degree or credential	17	33	100
Cooperate with coworkers	0	100	100
Be tactful and considerate	0	50	100
Concentrate in distracting or stressful situations	0	50	100
Be fair and impartial	0	50	83
Be attractive and well groomed	0	33	83
Follow orders and support company policies	0	17	83

Table D-12 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Have attended the right college	17	0	33
Have manual dexterity	0	33	50
Have physical coordination	0	0	17
Have physical strength and endurance	0	0	17

Table D-13

Secondary Teacher

Trait	% respondents rating trait as:		
	Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Be fair and impartial	89	100	100
Have integrity	78	100	100
Get information by reading	78	100	100
Evaluate, discipline, and praise others	78	100	100
Be dedicated and conscientious	78	100	100
Give information by talking with people	67	100	100
Plan ahead and anticipate problems	67	100	100
Have poise	56	100	100
Take initiative and responsibility	56	89	100
Coordinate and schedule activities	56	89	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Think logically and analytically	44	100	100
Have a lot of ideas	44	100	100
Be tactful and considerate	44	100	100
Be persuasive and motivating	44	100	100
Spot and tackle problems quickly	44	89	100
Learn quickly	44	78	100
Have a good memory	44	78	100
Handle several tasks at one time	44	78	89
Think of new approaches to problems	33	89	100
Concentrate in distracting or stressful situations	33	78	100
Cooperate with coworkers	33	67	100
Make decisions quickly	33	67	100
Represent company well to the public	33	67	89
Get information by talking with people	22	89	100
Have higher degree or credential	11	67	100
Follow orders and support company policies	11	67	100
Pay attention to details	0	78	100
Be attractive and well groomed	0	67	89
Rated as SOMEWHAT HELPFUL by at least 80% of respondents			
Give information by writing reports, memos, etc.	33	55	100
Visualize things before completion	33	55	89

Table D-13 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by more than 20% of respondents			
Be good at math	11	44	78
Have good contacts	11	33	67
Have physical coordination	0	33	56
Have manual dexterity	0	22	44
Be competitive	0	11	67
Have physical strength and endurance	0	11	67
Have attended the right college	0	0	44

Table D-14

Physician

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as CRITICAL by at least 50% of respondents			
Get information by talking with people	89	100	100
Give information by talking with people	80	97	100
Have integrity	77	97	100
Have higher degree or credential	71	88	94
Get information by reading	63	97	100
Be dedicated and conscientious	63	97	100
Think logically and analytically	57	97	100
Pay attention to details	57	94	100
Handle several tasks at one time	57	86	97
Make decisions quickly	54	89	100
Plan ahead and anticipate problems	54	86	97
Spot and tackle problems quickly	51	94	100
Rated as VERY HELPFUL OR CRITICAL by at least 67% of respondents			
Concentrate in distracting or stressful situations	49	89	98
Learn quickly	43	91	100
Be tactful and considerate	34	89	100
Give information by writing reports, memos, etc.	34	71	86
Have a good memory	31	91	100
Have manual dexterity	31	68	82
Take initiative and responsibility	29	86	100
Visualize things before completion	29	71	91
Have poise	23	80	100
Think of new approaches to problems	23	68	97
Coordinate and schedule activities	20	71	94
Cooperate with coworkers	17	77	100
Rated as at least SOMEWHAT HELPFUL by at least 80% of respondents			
Be fair and impartial	24	56	94
Be persuasive and motivating	14	60	91
Evaluate, discipline, and praise others	14	57	83
Have good contacts	11	46	89
Have a lot of ideas	9	49	89
Be attractive and well groomed	0	51	94
Be good at math	0	40	83

Table D-14 - Cont.

Trait	% respondents rating trait as: Critical	Very Helpful or Critical	At Least Somewhat Helpful
Rated as making NO DIFFERENCE by at least 20% of respondents			
Have physical coordination	20	49	71
Be competitive	12	41	74
Represent company well to the public	11	31	62
Have physical strength and endurance	6	34	57
Have attended the right college	3	14	63
Follow orders and support company policies	0	21	53

Appendix E

Occupations Included in Each of the OAP Clusters

This appendix shows occupations included in each of the eleven clusters. The lists of titles were taken from the OAP Manual (U.S. Department of Labor, 1979b) but have been reorganized here according to their cluster membership. The criteria for the inclusion of these 2,556 titles (out of all 12,099) are given in the Manual (p.10).

The GOE interest areas represented in each cluster are also shown.

Cluster A

Researching, Designing, and Modifying Physical Systems

Interest Areas Included

2 -- Scientific
5 -- Mechanical
11 -- Humanitarian

Occupations Included

Occupations in Physical Sciences

(GOE p. 38)

Astronomer	021.067-010
Chemist	022.061-010
Computer-Applications Engineer	020.062-010
Environmental Analyst	029.081-010
Geodesist	024.061-014
Geographer	029.067-010
Geographer, Physical	029.067-014
Geologist	024.061-018
Geophysical Prospector	024.061-026
Geophysicist	024.061-030
Hydrologist	024.061-034
Mathematician	020.067-014
Metallurgist, Physical	011.061-022
Meteorologist	025.062-010
Mineralogist	024.061-038
Petrologist	024.061-046
Physicist	023.061-014
Physicist, Theoretical	023.067-010
Project Manager, Environmental Research	029.167-014
Seismologist	024.061-050
Stratigrapher	024.061-054

(GOE p. 41)

Occupations in Life Sciences

Agronomist	040.061-010
Anatomist	041.061-010
Animal Scientist	040.061-014
Anthropologist, Physical	055.067-014
Aquatic Biologist	041.061-022
Biochemist	041.061-026
Biologist	041.061-030
Biomedical Engineer	019.061-010
Biophysicist	041.061-034
Botanist	041.061-038
Chemist, Food	022.061-014
Dairy Technologist	040.061-022
Dietitian, Research	077.061-010
Entomologist	041.061-046
Food Technologist	041.081-010
Geneticist	041.061-050
Histopathologist	041.061-054
Horticulturist	040.061-038
Microbiologist	041.061-058
Mycologist	041.061-062
Parasitologist	041.061-070
Pathologist	070.061-010
Pharmacologist	041.061-074
Physiologist	041.061-078
Plant Pathologist	041.061-086
Range Manager	040.061-046
Soil Conservationist	040.061-054
Soil Scientist	040.061-058
Veterinary Anatomist	073.061-014
WoodTechnologist	040.061-062
Zoologist	041.061-090

Occupations in Medical Sciences

(GOE p. 43)

Anesthesiologist	070.101-010
Audiologist	076.101-010
Chiropractor	079.101-010
Dentist	072.101-010
Dermatologist	070.101-018
General Practitioner	070.101-022
Gynecologist	070.101-034
Intern	070.101-038
Internist	070.101-042
Medical Officer	070.101-046
Obstetrician	070.101-054
Ophthalmologist	070.101-058
Optometrist	079.101-018
Oral Pathologist	072.061-010
Oral Surgeon	072.101-018
Orthodonist	072.101-022
Osteopathic Physician	071.101-010
Pediatrician	070.101-066
Pedodontist	072.101-026
Periodontist	072.101-030
Physiatrist	070.101-070
Physician,Head	070.101-074
Physician, Occupational	070.101-078
Podiatrist	079.101-022
Prosthodontist	072.101-034
Psychiatrist	070.107-014
Radiologist	070.101-090
Speech Pathologist	076.107-010
Surgeon 1	070.101-094
Urologist	070.101-098
Veterinarian	073.101-010

(GOE p. 285)

Occupations in Mathematics and Statistics

Actuary	020.167-010
Consultant	189.167-010
Engineering Analyst	020.067-010
Financial Analyst	020.167-014
Manager, Electronic Data Processing	169.167-030
Mathematical Technician	020.162-010
Operations-Research Analyst	020.067-018
Programmer, Business	020.162-014
Programmer, Chief, Business	020.167-018
Programmer, Engineering and Scientific	020.167-022
Statistician, Applied	020.167-026
Statistician, Mathematical	020.067-022
Systems Analyst, Electronic Data Processing	012.167-066

(GOE p. 72)

Occupations in Engineering

Aerodynamist	002.061-010
Aeronautical-Design Engineer	002.061-022
Aeronautical Engineer	002.061-014
Aeronautical-Research Engineer	002.061-026
Aeronautical Test Engineer	002.061-018
Agricultural Engineer	013.061-010
Architect	001.061-010
Architect, Marine	001.061-014
Automotive Engineer	007.061-010
Ceramic Engineer	006.061-014
Chemical Engineer	008.061-018
Civil Engineer	005.061-014
Configuration Management Analyst	012.167-010
Director, Research and Development	189.117-014
Electrical Engineer	003.061-010
Electrical Engineer, Power System	003.167-018
Electrical-Research Engineer	003.061-026
Electrical Technician	003.161-010
Electrical Test Engineer	003.061-014
Electronics Engineer	003.061-030
Electronics Technician	003.161-014
Electronics-Test Engineer	003.061-042
Engineer-in-Charge, Transmitter	003.167-034
Fire-Protection Engineer	012.167-026
Forest Engineer	005.167-018
Health Physicist	079.021-010
Illuminating Engineer	003.061-046
Industrial Engineer	012.167-030
Landscape Architect	001.061-018
Loser Technician	019.181-010
Logistics Engineer	019.167-010
Manufacturing Engineer	012.167-042
Marine Engineer	014.061-014
Mechanical-Design Engineer, Products	007.061-022
Mechanical Engineer	007.061-014
Mechanical-Engineering Technician	007.161-026
Metallurgist, Extractive	011.061-018
Mining Engineer	010.061-014
Nuclear Engineer	015.061-014
Optical Engineer	019.061-018
Optomechanical Technician	007.161-030
Ordnance Engineer	019.061-022
Petroleum Engineer	010.061-018
Planning Engineer, Central Office Facilities	003.061-050
Plant Engineer	007.167-014
Pollution-Control Engineer	019.081-018
Production Engineer	012.167-046
Production Planner	012.167-050
Product-Safety Engineer	012.061-010
Quality-Control Engineer	012.167-054
Railroad Engineer	005.061-026
Safety Engineer	012.061-014
Safety Engineer, Mines	010.061-026

Sales Engineer, Aeronautical Products	002.151-010
Sales-Engineer, Electrical Products	003.151-010
Sales Engineer, Mechanical Equipment	007.151-010
Sales Engineer, Mining-and-Oil-Well Equipment and Service	010.151-010
Sanitary Engineer	005.061-030
Structural Engineer	005.061-034
Systems Engineer, Electronic Data Processing	003.167-062
Time-Study Engineer	012.167-070
Tool Designer	007.061-026
Tool Planner	012.167-074
Tool Programmer, Numerical Control	007.167-018
Transportation Engineer	005.061-038
Welding Engineer	011.061-026

Cluster B

Operating and Testing Physical Systems

Interest Areas Included

2 -- Scientific
3 -- Plants and Animals
5 -- Mechanical

Occupations Included

Occupations in Managerial Work: Mechanical

(GOE p. 77)

Appliance-Service Supervisor	187.167-010
Director, Quality Control	012.167-014
Dispatcher, Chief 1	184.167-038
General Supervisor	183.167-022
Maintenance Supervisor	184.167-050
Manager, Bulk Plant	181.117-010
Manager, Customer Technical Services	189.117-018
Manager, Food Processing Plant	183.167-026
Mine Superintendent	181.117-014
Production Superintendent	183.117-014
Representative, Personal Service	236.252-010
Superintendent, Building	187.167-190
Superintendent, Concrete-Mixing Plant	182.167-022
Superintendent, Construction	182.167-026
Superintendent, Electric Power	184.167-162
Superintendent, Drilling and Production	181.167-014
Superintendent, Maintenance	184.167-170
Superintendent, Maintenance	184.167-174
Superintendent, Maintenance	189.167-046
Superintendent, Oil-Well Services	010.167-018
Superintendent, Sanitation	188.167-098
Superintendent, Water-and-Sewer Systems	184.161-014
Supervisor of Communications	184.167-230
Supervisor, Mine	181.167-018
Supervisor, Sewer System	184.167-238
Supervisor, Waterworks	184.167-246
Tooling Coordinator, Production Engineering	169.167-054

Occupations in Engineering Technology

(GOE p. 81)

Air Traffic Control Specialist, Station	193.162-014
Air-Traffic-Control Specialist, Tower	193.162-018
Chief Drafter	007.261-010
Chief of Party	018.167-010
Construction Inspector	182.267-010
Detailer	017.261-018
Die-Drawing Checker	007.167-010
Dispatcher	912.167-010
Drafter, Aeronautical	002.261-010
Drafter, Architectural	001.261-010
Drafter, Assistant	017.281-018
Drafter, Automotive Design	017.281-022
Drafter, Automotive Design Lay-Out	017.281-026
Drafter, Cartographic	018.261-010
Drafter, Civil	005.281-010
Drafter, Commercial	017.261-026
Drafter, Electrical	003.281-010
Drafter, Electronic	003.281-014
Drafter, Geological	010.281-014
Drafter, Heating and Ventilating	017.261-034
Drafter, Marine	014.281-010
Drafter, Mechanical	007.281-010
Drafter, Oil and Gas	017.281-030
Drafter, Structural	005.281-014
Engineering Assistant, Mechanical Equipment	007.161-018
Estimator	160.267-018
Estimator	166.261-018
Field Engineer	193.262-018
Flight Engineer	621.261-018
Industrial Engineering Technician	012.267-010
Inspector, Building	168.167-030
Inspector, Quality Assurance	168.287-014
Land Surveyor	018.167-018
Material Scheduler	012.187-010
Observer, Seismic Prospecting	010.161-018
Packaging Engineer	019.187-010
Potogrammetrist	018.261-026
Pollution-Control Technician	029.261-014
Radiation Monitor	199.167-010

Radiotelephone Operator	193.262-034
Specification Writer	019.267-010
Surveyor Assistant, Instruments	018.167-034
Surveyor, Geodetic	018.167-038
Surveyor, Marine	018.167-046
Surveyor, Mine	018.167-050
Technical Illustrator	017.281-034
Tool-Drawing Checker	007.167-022
Traffic Technician	199.267-030
Transmitter Operator	193.262-038
Video Operator	194.282-010

(GOE p. 85)

Occupations in Air and Water Vehicle Operation

Airplane Pilot	196.263-010
Airplane Pilot, Commercial	196.263-014
Check Pilot	196.263-022
Helicopter Pilot	196.263-038
Instructor, Flying 1	196.223-010
Master, Ship	197.167-010
Test Pilot	196.263-042

(GOE p. 51)

Occupations in Managerial Work: Plants and Animals

Animal Breeder	410.161-010
Beekeeper	413.161-010
Cruiser	459.378-010
Farmer, Cash Grain	401.161-010
Farmer, Diversified Crops	407.161-010
Farmer, Field Crop	404.161-010
Farmer, General	421.161-010
Farmer, Tree-Fruit-and-Nut Crops	403.161-010
Farmer, Vegetable	402.161-010
Field Contractor	162.117-022
Fish Farmer	446.161-010
Forester Aide	452.364-010
Fur Farmer	410.161-014
Game-Bird Farmer	412.161-010
General Manager, Farm	180.167-018
Horticultural-Specialty Grower, Field	405.161-014
Landscape Contractor	182.167-014
Landscape Gardener	408.161-010
Livestock Rancher	410.161-018
Manager, Dairy Farm	180.167-026
Manager, Fish Hatchery	180.167-030
Manager, Nursery	180.167-042
Poultry Farmer	411.161-018
Superintendent, Production	180.167-058
Tree Surgeon	408.181-010
Wildlife Control Agent	379.267.010

(GOE p. 46)

Occupations in Laboratory Technology

Assayer	022.281-010
Biological Aide	049.384-010
Cephalometric Analyst	078.384-010
Chemical-Laboratory Technician	022.261-010
Chemistry Technologist	078.261-010
Criminalist	029.281-010
Cytotechnologist	078.281-010
Decontaminator	199.384-010
Embalmer	338.371-014
Film Laboratory Technician 1	976.381-010
Fingerprint Classifier	375.387-010
Food Tester	029.361-014
Laboratory Tester	022.281-018
Laboratory Tester	029.261-010
Medical-Laboratory Assistant	078.381-010
Medical-Laboratory Technician	078.381-014
Medical Technologist	078.361-014
Metallurgical Technician	011.261-010
Pilot-Control Operator	559-382-046
Quality-Control Technician	012.261-014
Scientific Helper	199.364-014
Tester	011.361-010
Tester	029.261-022
Tissue Technologist	078.361-030
Ultrasound Technologist	078.364-010
Weather Observer	025.267-014

Cluster C

Crafting, Assembling, Repairing, Inspecting, Setting Up or Operating Equipment

Interest Areas Included

1 -- Artistic
3 -- Plants and Animals
5 -- Mechanical
6 -- Industrial
9 -- Accommodating

Occupations Included

Sub-cluster C-1: Spatial orientation

(GOE p. 104)

Occupations in Quality Control

Airplane Inspector	621.261-010
Automobile-Repair-Service Estimator	620.261-018
Bridge Inspector	869.287-010
Electrical Inspector	168.167-034
Elevator Examiner-and-Adjuster	825.261-014
Gravel Inspector	859.281-010
Inspector, Aircraft Launching and Arresting System	806.264-014
Inspector, Tool	601.281-022
Outside Production Inspector	806.281-046
Test Driver 2	806.283-010

(GOE p. 138)

Occupations in Production Technology

Boring-Machine Set-Up Operator, Jig	606.280-010
Boring-Mill Set-Up Operator, Horizontal	606.280-014
Diesel-Engine Tester	625.261-010
Grinder Operator, External, Tool	603.280-010
Grinder Operator, Tool	603.280-018
Grinder Set-Up Operator, Internal 1	603.280-022
Inspector	612.261-010
Inspector, Aircraft Accessories	709.261-010
Inspector, Assemblies and Installations	806.281-022
Inspector, Gage and Instrument	601.281-018
Inspector, Metal Fabricating	619.261-010
Knitting-Machine Fixer	689.280-014
Loom Fixer	683.260-018
Machine Fixer	689.260-010
Machine Setter	692.260-010
Refinery Operator	549.260-010
Taster	529.281-010
Tester, Motors and Controls	721.281-030
Tool-Grinder Operator	603.280-038
Turret-Lathe Set-Up Operator, Tool	604.280-022
Watch Repairer	715.281-010

(GOE p. 28)

Occupations in Craft Arts

Airbrush Artist	970.281-010
Carver, Hand	761.281-010
Decorator	298.381-010
Decorator	524.381-014
Engraver, Hand, Soft Metals	704.381-030
Etcher	704.684-010
Etcher, Photoengraving	971.381-014
Form Designer	970.361-010
Glass Bender	772.381-010
Jeweler	700.281-010
Letterer	970.661-014
Lithographic Plate Maker	972.381-010
Milliner	784.261-010
Model Maker	709.381-018
Museum Technician	102.381-010
Painter, Hand	970.381-022
Painter, Sign	970.381-026
Photoengraver	971.381-022
Photoengraving Finisher	971.381-030
Photoengraving Printer	971.381-034
Photographer, Lithographic	972.382-014
Photographer, Photoengraving	971.382-014
Photograph Retoucher	970.281-018
Picture Framer	739.684-146
Process Artist	972.281-010
Sign Writer, Hand	970.281-022
Silversmith	700.281-022
Sound Cutter	962.382-014
Stripper	971.381-050
Taxidermist	199.261-010
Transferrer	972.381-026
Wig Dresser	332.361-010

Occupations in Craft Technology (GOE p. 88)

Air-Conditioning Installer-Servicer, Window Unit	637.261.010
Air-Conditioning Mechanic	620.281-010
Airframe-and-Power-Plant Mechanic	621.281-014
Alteration Tailer	785.261-010
Arc Cutter	816.364-010
Assembler, Metal Building	801.381.010
Automobile-Body Repairer	807.381.010
Automatic-Equipment Technician	822.281-010
Automotive-Maintenance-Equipment Servicer	620.281-016
Automobile Mechanic	620.261-010
Automobile Upholsterer	780.381-010
Biomedical Equipment Technician	719.261-010
Blacksmith	610.381-010
Boatbuilder, Wood	860.381-018
Body Wirer	829.684-014
Boilermaker 1	805.261-014
Boilermaker 2	805.381-010
Bookbinder	977.381-010
Bricklayer	861.381-014
Bricklayer	861.381-018
Cable Installer-Repairer	821.361-010
Cable Splicer	829.361-010
Carpenter	860.381-022
Carpenter, Bridge	860.381-030
Carpenter, Maintenance	860.281-010
Carpenter, Rough	860.381-042
Carpenter, Ship	860.281-014
Car Repairer	622.381-014
Cement Mason	844.364-010
Central-Office Installer	822.361-014
Central-Office Repairer	822.281-014
Construction-Equipment Mechanic	620.261-022
Cook	313.361-014
Dairy-Equipment Repairer	629.281-018
Die Maker, Bench, Stamping	601.281-010
Dental-Laboratory Technician	712.381-018
Diesel Mechanic	625.281-010
Die Sinker	601.280-022
Diver	899.261-010
Dressmaker	785.361-010
Drill-Press Set-Up Operator, Single Spindle	606.682-018
Electrical-Appliance Servicer	827.261-010
Electrical Repairer	829.281-014
Electrician	824.261-010
Electrician	825.281-014
Electrician	825.381-030
Electrician, Airplane	825.281-018
Electrician, Automotive	825.281-022
Electrician, Locomotive	825.281-026
Electrician, Powerhouse	820.261-014
Electric-Meter Repairer	729.281-014
Electric-Motor Repairer	721.281-018
Electronic-Organ Technician	828.261-010
Electronic Assembler, Developmental	726.261-010
Electronics Mechanic	828.281-010
Electrotyper	974.381-010
Elevator Constructor	825.361-010
Elevator Repairer	825.281-030
Environmental-Control-System Installer-Servicer	637.261-014
Farm-Equipment Mechanic 1	624.281-010
Field Engineer	828.261-014
Field-Service Representative	621.221-010
Fitter 1	801.261-014
Fixture Maker	600.380-010
Form Builder	693.280-010
Form Builder	860.381-046
Furnace Installer-and Repairer, Hot Air	869.281-010
Furniture Finisher	763.381-010
Furniture Upholsterer	780.381-018
Furrier	783.261-010
Gas-Main Fitter	862.361-014
Gem Cutter	770.281-014
Gemologist	199.281-010
Gunsmith	632.281-010
House Builder	869.281-014
Instrument Maker	600.280-010
Instrument Mechanic	710.281-026
Joiner	860.381-050
Lay-Out Worker	600.281-018
Lay-Out Worker 1	809.281-010
Line Erector	821.361-018
Line Installer-Repairer	822.381-014
Line Maintainer	821.261-014
Line Repairer	821.361-026
Locksmith	709.281-010
Machine Builder	600.281-022
Machine Repairer, Maintenance	626.281-010
Machinist	600.280-022
Machinist, Experimental	600.280-038
Machinist, Marine Engine	623.281-026
Machinist, Wood	669.380-014
Maintenance Machinist	600.280-042
Maintenance Mechanic	620.281-046
Maintenance Mechanic	638.281-014
Maintenance Mechanic, Telephone	822.281-018
Manufacturer's Service Representative	638.261-018
Marble Setter	861.381-030
Mechanical-Test Technician	869.261-014
Mechanic, Industrial Truck	620.281-050
Metal Fabricator	619.360-014
Millwright	638.281-018
Mold Maker, Die-Casting and Plastic Molding	601-280-030
Monument Setter	861.361-014
Motorboat Mechanic	623.281-038
Motorcycle Repairer	620.281-054
Office-Machine Servicer	633.281-018
Offset-Press Operator 1	651.482-010
Oil-Burner-Servicer-and-Installer	862.281-018
Oil-Field Equipment Mechanic	629.381-014
Optician	716.280-008
Optician	716.280-014
Optician, Dispensing 1	713.361-014
Ornamental-Iron Worker	809.381-022
Orthotist	078.261-018

Paperhanger	841.381-010
Parts Salvager	638.281-026
Patternmaker, Metal	600.280-050
Patternmaker, Metal, Bench	693.281-018
Patternmaker, Wood	661.281-022
Piano Technician	730.281-038
Piano Tuner	730.361-010
Pinsetter Adjuster, Automatic	829.381-010
Pipe Fitter	862.261-010
Pipe Fitter	862.381-018
Pipe Fitter, Diesel Engine 1	862.361-016
Pipe-Organ Tuner and Repairer	730.361-014
Plasterer	842.361-018
Plumber	862.381-030
Press Maintainer	627.281-010
Private-Branch-Exchange Repairer	822.281-022
Proof-Press Operator	651.582-010
Prosthetist	078.261-022
Prosthetics Technician	712.381-038
Public-Address Servicer	823.261-010
Pump Servicer	630.281-018
Radio Mechanic	823.261-018
Refrigeration Mechanic	637.261-026
Reinforcing-Metal Worker	801.684-026
Repairer, Heavy	620.381.022
Rigger	806.261-014
Rocket-Engine-Component Mechanic	621.281-030
Rug Repairer	782.381-018
Sample Stitcher	785.361-018
Saw Filer	701.381-014
Scientific Glass Blower	006.261-010
Service Mechanic, Compressed Gas Equipment	630.281-034
Sheet-Metal Worker	804.281-010
Shipfitter	806.381-046
Shipwright	860.381-058
Shoe Repairer	365.361-014
Shop Tailor	785.361-022
Signal Maintainer	822.281-026
Small-Engine Mechanic	625.281-034
Statistical-Machine Servicer	633.281-030
Station Installer-and-Repairer	822.261-022
Steeple Jack	869.381-030
Stereotyper	974.382-014
Stonecutter, Hand	771.381-014
Stonemason	861.381-038
Street-Light Servicer	824.381-010
Structural-Steel Worker	801.361-014
Stucco Mason	842.381-014
Taximeter Repairer	710.281-038
Terrazzo Worker	861.381-046
Tile Setter	861.381-054
Timber Framer	869.381-034
Tool-and-Die Maker	601.280-046
Tool Grinder 1	701.381-018
Tool-Machine Set-Up Operator	601.280-054
Tool Maker	601.280-042
Tool Maker, Bench	601.281-026
Tractor Mechanic	620.281-058
Trouble Shooter 2	821.261-026
Truck-Body Builder	807.281-010
Tune-Up Mechanic	620.281-066
Upholstery Repairer	780.684-122
Variety-Saw Operator	667.682-086
Web-Press Operator	651-362-030
Welder, Arc	810.384-014
Welder-Assembler	819.381-010
Welder, Combination	819.384-010
Welder, Experimental	819.281-022
Welder-Fitter	819.261-010
Welder, Gas	811.684-014

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Occupations in Land and Water Vehicle Operation

Ambulance Driver	913.683-010
Coin Collector	292.483-010
Concrete-Mixing-Truck Driver	900.683-010
Deckhand	911.687-022
Dump-Truck Driver	902.683-010
Escort-Vehicle Driver	919.663-022
Firer, Locomotive	910.363-010
Garbage Collector Driver	905.663-010
Hostler	909.663-010
Liquid-Fertilizer Servicer	906.683-014
Locomotive Engineer	910.363-014
Motor Operator	910.683-014
Newspaper-Delivery Driver	292.363-010
Tank-Truck Driver	903.683-018
Telephone-Directory-Distribution Driver	906.683-018
Tow-Truck Operator	919.663-026
Tractor-Trailer-Truck Driver	904.383-010
Truck Driver, Heavy	905.663-014
Truck Driver, Light	906.683-022
Van Driver	905.663-018
Yard Engineer	910.363-018

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Occupations in Crafts

Adjuster, Electrical Contacts	724.381-010
Air-Conditioning Installer, Domestic	827.464-010
Airport Attendant	912.364-010
Attendant, Lodging Facilities	329.467-010
Audio Operator	194.262-010
Automobile-Service-Station Attendant	915.467-010
Baker	313.381-010
Baker, Pizza	313.381-014
Blaster	859.261-010
Blaster	931.261-010
Boat Outfitter	806.484-014
Brake Repairer	620.281-026
Carpet Layer	864.381-010
Casting-Machine Operator	654.382-010
Coin-Machine-Servicer Repairer	639.281-014
Color-Printer Operator	976.382-014
Conveyor-Maintenance Mechanic	630.381-010
Cook	305.281-010
Cook	315.361-010

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Cook	315.381-010
Cook, Mess	315.371-010
Cook, Pastry	313.381-026
Cook, Railroad	315.381-018
Cook, Short Order 1	313.361-022
Cook, Specialty	313.361-026
Cook, Specialty, Foreign Food	313.361-030
Custom Ski Maker	732.281-010
Drapery Hanger	869.484-014
Electrical-Appliance Repairer	723.381-010
Electrical Repairer	825.381-010
Engraver, Pantograph 1	704.382-010
Exterminator, Termite	383.364-010
Farm-Equipment Mechanic 2	624.381-014
Fire-Extinguisher Repairer	709.384-010
Floor Layer	864.481-010
Formula-Room Worker	520.487-014
Front-End Mechanic	620.281-038
Gas-Appliance Servicer	637.261-018
Gas-Meter Mechanic 1	710.381-022
Glazier	865.381-010
House Repairer	869.381-010
Lather	842.361-010
Laundry-Machine Mechanic	629.261-010
Light Technician	962.362-014
Maintenance Repairer, Building	899.381-010
Maintenance Repairer, Factory or Mill	899.281-014
Make-Up Arranger	973.381-026
Mechanic, Aircraft Accessories	621.381-014
Motion-Picture Projectionist	960.362-010
New-Car Get-Ready Mechanic	806.361-026
Optician, Dispensing 2	299.474-010
Ordnance Artificer	632.261-018
Painter	840.381-010
Painter, Shipyard	840.381-018
Painter, Transportation Equipment	845.381-014
Parking-Meter Servicer	710.384-026
Photograph Finisher	976.487-010
Pinsetter Mechanic, Automatic	638.261-022
Radio Repairer	720.281-010
Recording Engineer	194.362-010
Repairer, Manufactured Buildings	869.384-010
Repeat Chief	970.361-014
Reproduction Technician	976.361-010
Roofer	866.381-010
Salad Maker	317.384-010
Second Cook and Baker	315.381-026
Section-Plotter Operator	194.382-010
Service Manager	185.167-058
Sewing-Machine Repairer	639.281-018
Shooter	931.361-014
Telecine Operator	194.362-018
Television Installer	823.361-010
Television-and-Radio Repairer	720.281-018
Thermal Cutter, Hand 1	816.464-010
Tile Conduit Layer	861.381-062
Transmission Mechanic	620.281-062
Trouble Shooter 1	952.364-010
Valve Repairer	630.381-030

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Occupations in Equipment Operation

Asphalt-Paving-Machine Operator	853.663-010
Auxiliary-Equipment Tender	869.665-010
Bridge-or Gantry-Crane Operator	921.663-010
Bulldozer Operator 1	850.683-010
Coke Loader	921.563-010
Concrete-Paving-Machine Operator	853.663-014
Continuous-Mining-Machine Operator	930.683-010
Conveyor Operator	921.683-026
Cutter-Operator	930.683-014
Derrick Operator	921.663-022
Dinkey Operator	919.663-014
Dragline Operator	850.683-018
Drilling Machine Operator	930.482-010
Dump Operator	921.685-038
Earth-Boring-Machine Operator	859.682-010
Hoisting Engineer	921.663-030
Loading-Maching Operator	932.683-014
Locomotive-Crane Operator	921.663-038
Long-Wall-Mining-Machine Tender	930.665-010
Miner	850.381-010
Miner 1	939.281-010
Motor-Grader Operator	850.663-022
Operating Engineer	859.683-010
Perforator Operator, Oil Well	931.382-010
Pile-Driver Operator	859.683-018
Power-Shovel Operator	850.683-030
Prospecting Driller	930.382-018
Rigger	921.260-010
Road-Roller Operator	859.683-030
Roof Bolter	930.683-026
Rotary Derrick Operator	930.382-022
Rotary Driller	930.382-026
Sanitary Landfill Operator	955.463-010
Scraper Operator	850.683-038
Septic-Tank Installer	851.663-010
Shuttle-Car Operator	932.682-022
Stevedore 1	911.663-014
Street-Sweeper Operator	919.683-022
Tractor-Crane Operator	921.663-058
Tractor Operator	929.683-014
Truck-Crane Operator	921.663-062
Utility-Tractor Operator	850.683-046
Well-Driller Operator	859.362-010
Well Puller	930.382-030
Yarding Engineeer	921.663-066

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Occupations in Production Technology

Assembler	710.681-010
Assember	722.381-010
Assembler, Aircraft, Structures and Surfaces	806.381-026
Assembler, Gold Frame	713.384-010
Bench Hand	735.381-010
Calibrator	710.681-014
Canvas Worker	739.381-010
Card Grinder	680.380-010
Cheese Blender	520.487-010
Chemical Operator 3	559.382-018
Cook, Kettle	526.381-026
Coremaker	518.381-014
Die Setter	612.360-010
Drill-Press Set-Up Operator, Radial	606.380-014
Electronics Inspector 1	726.381-010
Engine-Lathe Set-Up Operator	604.380-018
Glass Blower	772.681-010
Grinder Machine Setter	603.380-010
Inspector	559.381-010
Inspector, Fabrication	806.361-022
Inspector, Mechanical and Electrical	710.381-038
Inspector, Motors and Generators	721.361-010
Job Setter	600.380-014
Machine Operator	616.360-018
Machine Set-Up Operator	600.380-018
Machine Set-Up Operator, Paper Goods	649.380-010
Machine Setter	616.360-022
Metal Sprayer, Machined Parts	505.380-010
Milling-Machine Operator, Numerical Control	605.380-010
Molder	518.361-010
Nail-Making-Machine Setter	616.460-010
Optical-Instrument Assembler	711.381-010
Process Inspector	736.381-018
Role-Tube Setter	613.360-014
Rolling-Mill Operator	613.462-018
Router Set-Up Operator, Numerical Control	605.360-010
Rubber-Goods Cutter-Finisher	690.680-010
Skin Fitter	806.381-054
Solderer	700.381-050
Storage Battery Inspector and Tester	727.381-022
Transformer Assember	820.381-014
Tube Assembler, Electron	725.384-010
Turret-Lathe Set-Up Operator	604.380-026

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Occupations in Barber and Beauty Services

Barber	330.371-010
Cosmetologist	332.271-010
Hair Stylist	332.271-018

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Occupations in Passenger Services

Bus Driver	912.463-010
Chauffeur	359.673-010
Chauffeur	913.663-010
Instructor, Driving	099.223-010
Taxi Driver	913.463-018

Sub-cluster C-2: Quick, accurate manipulation

Occupations in Crafts (GOE p. 115)

Airframe-and-Power-Plant-Mechanic Helper	621.684-010
Appliance Repairer	723.584-010
Bicycle Repairer	639.681-010
Blueprinting-Machine Operator	979.682-014
Butcher, Chicken and Fish	316.684-010
Butcher, Meat	316.681-010
Carpet-Layer Helper	864.687-010
Construction Worker 1	869.664-014
Cook, Short Order 2	313.671-010
Developer	976.681-010
Dry-Wall Applicator	842.681-010
Exterminator	389.684-010
Fence Erector	869.684-022
Finish Patcher	763.684-034
Frame Wirer	822.684-010
Glass Installer	865.684-010
Household-Appliance Installer	827.661-010
Maintenance-Repairer Helper, Factory or Mill	899.684-022
Meat Cutter	316.684-018
Muffler Installer	807.664-010
Net Repairer	449.664-010
Offset-Duplicating-Machine Operator	207.682-018
Offset-Duplicating-Machine Operator	651.682-041
Painter, Spray 1	741.684-026
Pantry Goods Maker	317.684-014
Pipeliner	899.684-026
Pot Liner	519.664-014
Printer Operator, Black-and-White	976.682-014
Repairer, Assembled Wood Products	769.684-038
Riveter	800.684-010
Riveter, Pneumatic	800.684-014
Roustabout	869.684-046
Sider	863.684-014
Sign Erector 2	869.684-054
Sports-Equipment Repairer	732.684-122
Stopping Builder	869.684-058
Swimming-Pool Servicer	891.684-018
Taper	842.664-010
Typesetter-Machine Tender	650.685-010
Used-Car Renovator	620.684-034
Water-Softener Service-and-Installer	862.684-034
Welder, Tack	810.684-010

Occupations in Production Work (GOE p. 147)

Annealer	504.682-010
Anodizer	500.682-010
Appliance Assembler, Line	827.684-010
Assembler	706.684-014
Assembler	710.381-010
Assembler	869.684-010
Assembler 1	723.684-014
Assembler, Aircraft Power Plant	806.381-022
Assembler, Electric Accessories 2	729.384-010
Assembler, Electrical Wire Group	728.384-010
Assembler-Installer, General	806.361-014
Assembler, Internal Combustion Engine	806.481-014
Assembler, Product	706.684-018
Assembler, Subassembly	806.484-010
Assembler, Unit	809.681-010
Back Tender, Paper Machine	534.662-010
Balloon Maker	752.684-010
Beater Engineer	530.662-010
Bench Hand	520.384-010
Bleacher, Pulp	533.362-010
Blender	540.462-010
Blower and Compressor Assembler	801.361-010
Book-Sewing-Machine Operator 2	653.682-010
Box Maker, Wood	760.684-014
Box Printer	652.682-010
Brazer, Assembler	813.684-010
Bumper Operator	617.682-014
Buttermaker	529.362-010
Cabinet Assembler	763.684-014
Cable Maker	728.684-010
Candy Maker	529.361-014
Carpet Weaver	683.682-010
Casket Assembler	739.481-010
Casket Liner	780.684-030
Caster	502.482-010
Casting Operator	514.662-010
Cigarette Making-Machine Operator	529.685-066
Clicking-Machine Operator	789.382-010
Coal Washer	541.382-010
Cobbler	788.381-010
Coil Connector	721.684-018
Compression-Molding-Machine Operator	556.682-014
Compressor	556.382-010
Concrete-Stone Fabricator	575.461-010
Corrugator Operator	641.562-010
Cracker-and-Cooky-Machine Operator	520.482-010
Cupola Tender	512.662-010
Cut-Off-Saw Operator	667.682-022
Cut-Off-Saw Operator, Metal	607.682-010
Cutter, Hand 1	781.584-014
Cutter, Machine 1	781.684-014
Cutter Operator	699.682-018
Cutting-Machine Operator	640.682-015
Cylinder-Machine Operator	539.362-010

Dairy-Processing-Equipment Operator	529.382-018
Die Cutter	699.682-022
Dipper	774.684-014
Doughnut Maker	526.684-010
Draper Operator	787.682-018
Drawer-In, Hand	683.684-014
Drawing-In-Machine Tender	683.682-018
Drill-Press Operator	606.682-014
Dry Cleaner	362.382-014
Electrical-Control Assembler	729.684-026
Electric-Motor Winder	721.484-010
Electronics Assembler	726.384-010
Electronics Assembler	726.684-018
Embroiderer, Hand	782.684-018
Embroidery-Machine Operator	787.682-022
Extruder Operator	557.382-010
Fabricator-Assembler, Metal Products	809.381-010
Film-Casting Operator	559.682-022
Fitter 2	706.684-054
Folding-Machine Operator	649.685-046
Fourdrinier-Machine Tender	539.362-014
Frame-Table Operator	669.662-014
Fur Cutter	783.381-010
Fur Finisher	782.381-014
Fur Machine Operator	783.682-010
Fur Nailer	783.684-014
Furnace Operator	512.362-014
Furniture Assembler	763.684-038
Gang Sawyer, Stone	670.362-010
Glass Cutter	775.684-022
Glass-Lathe Operator	674.382-010
Granulator-Machine Operator	559.382-026
Grinder Operator, Production	603.685-062
Grinder Set-Up Operator, Thread	603.482-026
Heading-Saw Operator	667.682-038
Heater	619.682-022
Heat Treater 2	504.682-018
Heavy Forger	612.361-010
Hosiery Mender	782.684-030
Injection-Molding-Machine Operator	556.382-014
Installer	869.684-026
Jig Fitter	801.684-010
Ladle Liner	519.684-010
Lay-Out Worker 2	809.381-014
Leather Worker	783.684-026
Machine Assembler	638.361-010
Machine Molder	518.682-010
Manipulator	613.682-010
Marker 1	781.384-014
Mattress Maker	780.684-074
Mender	782.684-042
Mender	787.682-030
Metal Hanger	809.684-030
Oven Tender	526.685-030
Oxygen-Plant Operator	552.362-014
Paper-Novelty Maker	794.684-022
Plastics Fabricator	754.684-042
Plater	500.380-010
Plater, Production	500.365-010
Polishing-Machine Operator	603.682-026
Pony Edger	667.682-050
Powder Worker, TNT	737.684-030
Precision Assembler, Bench	706.681-010
Press Operator, Heavy Duty	617.260-010
Printer-Slotter Operator	659.662-010
Punch-Press Operator 3	615.682-014
Ripsaw Operator	667.682-066
Rotor Casting-Machine Operator	502.482.018
Rougher Operator	613.662-014
Router	979.682-026
Rug Cleaner, Hand	369.384-014
Sander, Machine	761.682-014
Scalper Operator	605.682-022
Screen Printer	979.684-030
Screen-Printing-Machine Operator	652.682-018
Sewing-Machine Operator	787.682-046
Shaper, Hand	761.684-038
Shear Operator 1	615.482-034
Sign Writer, Machine	659.682-026
Slasher Tender	582.562-010
Slitting-Machine Operator 2	615.662-010
Smash Hand	683.684-026
Solderer-Assembler	813.684-014
Spaghetti-Machine Operator	690.682-074
Spotter	362.381-010
Springer	780.684-106
Steel Pourer	502.664-014
Steel-Pourer Helper	502.664-018
Sticher, Special Machine	690.682-078
Still-Pump Operator	549.362-010
Straightening-Press Operator	617.482-026
Stranding-Machine Operator	616.682-034
Stone Polisher, Machine	673.382-018
Supercalender Operator	534.682-038
Tanning Drum Operator	582.482-018
Tester, Motor	806.384-026
Threader	685.680-010
Tire Builder, Automobile	750.384-010
Tool Grinder	603.664-010
Trailer Assembler	806.381-058
Trimmer Sawyer	667.482-022
Trophy Assembler	735.684-018
Tube Bender, Hand 1	709.684-090
Tuber-Machine Operator	690.662-014
Upholsterer	869.684-070
Upholsterer, Inside	780.681-010
Upsetter	611.462-010
Valve Grinder	706.684-098
Vending-Machine Assembler	706.684-102
Warp-Knitting-Machine Operator	685.665-018
Weaver	683.682-034
Weaver, Hand	782.684-062
Weaver, Needle Loom	683.665-010
Welding-Machine Operator, Arc	810.382-010
Welding-Machine Tender	819.685-010

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Occupations in Quality Control

Assembler	369.687-010
Ampoule Examiner	559.687-010
Burler	689.684-010
Casting Inspector	514.687-010
Cloth Examiner, Hand	781.687-014
Cloth Inspector	685.687-010
Cloth Tester, Quality	689.384-010
Egg Candler	529.687-074
Electronics Inspector 2	726.684-022
Electronics Tester 2	726.684-026
Final Inspector	806.687-018
Finished-Stock Inspector	763.687-029
Garment Inspector	789.687-070
Garment Sorter	222.687-014
Grader	669.587-010
Grader, Dressed Poultry	529.687-102
Grader, Meat	525.387-010
Inspector	369.687-022
Inspector	590.367-010
Inspector	619.381-010
Inspector	732.364-010
Inspector	739.687-110
Inspector	769.687-026
Inspector	776.667-010
Inspector	788.384-010
Inspector 1	619.364-010
Inspector 1	729.387-022
Inspector 3	737.367-010
Inspector and Sorter	589.387-010
Inspector, Eyeglass Frames	713.687-022
Inspector, Fabric	789.587-014
Inspector, General	609.684-010
Inspector, Grain Mill Products	529.387-026
Inspector, Metal Can	709.367-010
Inspector, Packaging Materials	920.387-010
Inspector, Paper Products	649.367-010
Inspector, Slide Fasteners	734.687-062
Inspector, Surgical Instruments	712.687-026
Inspector, Type	706.687-026
Inspector, Wire	691.367-010
Laboratory Tester	689.384-014
Lumber Sorter	922.687-074
Machine Tester	706.387-014
Mailing Machine Operator	208.462-010
Marker	369.687-026
Motorcycle Tester	620.384-010
Nut Sorter	521.687-086
Pairer	684.687-010
Paper Sorter and Counter	649.687-010
Photo Checker and Assembler	976.687-014
Pulp-and-Paper Tester	539.364-010
Quality-Control Inspector	579.367-010
Quality-Control Inspector	725.687-026
Quality-Control Technician	529.387-030
Roller-Bearing Inspector	706.687-034
Selector	579.687-030
Shade Matcher	582.687-022
Shipping-and-Receiving Weigher	222.367-058
Stocking Inspector	684.684-010
Tablet Tester	559.667-010
Tire Inspector	750.687-018
Transmission Tester	806.684-134
Veneer Grader	569.587-010
Weigher, Alloy	509.687-022
Yarn Sorter	589.687-086

Cluster D

Tending (Machines, Buildings, Plants, Animals) and Attending (Workers, the Public)

Interest Areas Included

3 -- Plants and Animals
5 -- Mechanical
6 -- Industial
8 -- Selling
9 -- Accommodating

Occupations Included

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Occupations in Elemental Work: Industrial

Ampoule Filler	559.685-018
Artificial-Flower Maker	739.684-014
Assembler	723.684-010
Assembler	754.684-010
Assembler 2	723.684-018
Assembler, Automobile	806.684-010
Assembler, Cards and Announcements	794.687-010
Assembler, Electrical Accessories 1	729.687-010
Assembler, Production	706.687-010
Assembler, Production Line	809.684-010
Assembler, Small Parts	706.684-022
Assembler, Small Products	739.687-030
Back Tender, Insulation Board	532.685-010
Baker Helper	526.686-010
Bakery Worker	929.686-010
Bagger	920.687-018
Bag-Machine Tender or Operator	649.685-014
Baler	690.685-022
Baling-Machine Tender	920.685-010
Band-Sawing-Machine Operator	690.485-010
Basket Assembler 1	669.685-014
Batter Mixer	520.685-010
Battery-Parts Assembler	727.687-038
Beamer	681.585-010
Beam-Warper Tender, Automatic	681.685-018
Bearingnizer	603.685-018
Beater-Engineer Helper	530.665-010
Bellows Assembler	710.687-010
Bench Grinder	705.684-010
Beveler	673.685-018
Bindery Worker	649.685-018
Bindery Worker	653.685-010
Blast-Furnace-Keeper Helper	502.687-010
Block-Making-Machine Operator	575.685-014
Boarding-Machine Operator	589.685-010
Boner, Meat	525.684-010
Boring-Machine Operator, Production	606.685-010
Box Maker, Paperboard	794.684-014
Brine Maker	551.687-014

Buffer	690.685-046
Buffer 1	705.684-014
Burnisher	690.685-058
Buttoner	782.687-014
Cannery Worker	529.686-014
Carder	920.685-034
Card Tender	680.685-018
Carton-Forming-Machine Operator	641.685-022
Carton-Packaging-Machine Operator	920.665-010
Casing Cleaner	525.686-010
Casing Tier	529.687-034
Cementer, Hand	788.687-030
Cementer, Machine Applicator	690.686-018
Chemical Operator 2	558.585-014
Chipper	564.685-014
Cigarette-Making-Machine Catcher	529.666-014
Cigar Maker	790.684-014
Classifier	361.687-014
Cleaner and Polisher	709.687-010
Cloth Doffer	689.586-010
Cloth Folder, Hand	589.687-014
Cloth Winder	689.685-046
Coiler	613.685-010
Coil Winder	724.684-026
Collator, Hand	977.687-010
Comber Tender	680.665-010
Compounder	550.685-050
Concrete-Pipe-Making-Machine Operator	575.665-010
Condenser-Tube Tender	511.685-018
Conditioner-Tumbler Operator	361.685-010
Container Washer, Machine	529.685-074
Cook, Fry, Deep Fat	526.685-014
Cooler Room Worker	525.687-022
Coremaker, Machine 1	518.685-014
Coremaker, Pipe	518.684-014
Core-Oven Tender	518.685-010
Core Setter	518.684-010
Corrugated-Fastener Driver	669.685-042
Creeler	689.687-030

Crossband Layer	762.687-026
Crusher Tender	570.685-022
Cushion Builder	780.684-050
Cushion Maker 1	780.684-054
Cutter, Hand 2	781.687-026
Cutter, Hand 3	781.687-030
Cutter Helper	781.687-022
Cutter, Machine 2	699.685-014
Cutting-Machine Tender	690.685-122
Cylinder Batcher	582.665-010
Dairy Helper	529.686-026
Deburrer, Machine	715.685-018
Dipper	599.685-026
Distillery Worker, General	529.687-066
Dividing-Machine Operator	520.685-086
Doffer	689.686-022
Drawer-In-Helper, Hand	683.687-010
Draw-Frame Tender	680.685-034
Drilling-Machine Operator, Automatic	606.685-030
Dry Cleaner	589.685-038
Dry-Cleaner Helper	362.686-010
Dyer Helper	364.687-010
Dye-Tub Operator	582.585-014
Dye Weigher	550.684-014
Electric-Motor Assembler	721.684-022
Embossing-Press Operator	652.685-030
Enameler	509.684-010
Envelope-Machine Operator	649.685-042
Etcher, Printed Circuits	590.685-030
Extractor Operator	581.685-038
Eyelet-Machine Operator	699.685-018
Feed Mixer	520.685-098
Feed Weigher	920.685-058
Filler	739.687-090
Film Spooler	692.685-082
Fish Cleaner	525.684-030
Flatwork Finisher	363.686-010
Floor Attendant	579.687-018
Fly Tier	732.684-074
Folder	369.687-018
Folder, Hand	794.687-022
Folding-Machine Feeder	653.686-014
Folding-Machine Operator	583.685-042
Forge Helper	619.666-010
Forging-Press Operator 2	611.685-010
Foundry Worker, General	519.687-022
Fruit-Press Operator	521.685-146
Furnace Tender	512.685-010
Garment Folder	789.687-066
Gear-Cutting-Machine Operator, Production	602.685-010
General Helper	529.687-094
Glass Installer	865.684-014
Gluer	762.687-034
Gluer	795.687-014
Glue Spreader, Veneer	569.685-042
Golf-Club Assembler	732.684-078
Grinder 1	705.684-026
Grinder-Chipper 2	809.684-026
Grip Wrapper	732.684-082
Hacker	573.686-022
Hand Sewer, Shoes	788.684-054
Hardware Assembler	763.684-042
Heat-Treater Helper	504.685-018
Hot-Plate-Plywood-Press Operator	569.685-054
Icer, Hand	524.684-022
Icer, Machine	524.685-034
Icing Mixer	520.685-114
Industrial-Truck Operator	921.683-050
Injection-Molding-Machine Tender	556.685-038
Interlacer	788.684-070
Jet Handler	557.684-010
Jogger	659.686-010
Knitter, Full-Fashioned Garment	685.665-010
Knitting-Machine Operator	685.665-014
Knitting-Machine Operator	685.685-010
Laborer	529.687-130
Laborer	559.686-022
Laborer, Boot and Shoe	788.687-066
Laborer, Chemical Processing	559.687-050
Laborer, Cheesemaking	529.686-050
Laborer, Concrete Plant	579.686-010
Laborer, General	509.686-010
Laborer, General	518.687-026
Laborer, General	519.686-010
Laborer, General	559.685-110
Laborer, General	579.667-010
Laborer, General	589.686-026
Laborer, General	609.684-014
Laborer, General	754.687-010
Laborer, Grinding and Polishing	705.687-014
Laborer, Hot-Plate Plywood Press	569.686-026
Laborer, Rags	539.587-010
Laborer, Salvage	929.687-022
Laborer, Tin Can	609.686-010
Lacer 1	788.687-070
Lathe Operator, Production	604.685-026
Launderer, Hand	361.684-010
Laundry Laborer	361.687-018
Laundry Operator	369.684-014
Laundry Worker 2	361.685-018
Lead Former	691.685-018
Leasing-Machine Tender	681.685-054
Leather Finisher	363.682-010
Light-Bulb Assembler	692.685-118
Log Roller	677.687-010
Loom-Winder Tender	681.685-062
Machine Cleaner	699.687-014
Machine Feeder	819.686-010
Machine Helper	619.687-014
Machine Operator 2	619.685-062
Marker 2	920.687-126
Marker, Machine	690.685-282
Metal-Cleaner, Immersion	503.685-030
Metal-Fabricating-Shop Helper	619.686-022
Metal Finisher	705.684-034
Mexican Food Maker, Hand	520.687-046
Milling-Machine Operator, Production	605.685-030
Mill Operator	599.685-058
Mirror Specialist	779.684-038
Mixer	550.685-078
Mixer Operator	520.685-146
Mixer Operator	550.685-082
Mold-Fitting Operator	556.684-018
Molding Cutter	663.685-018
Mold Worker	514.567-010

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Mounter, Automatic	976.685-022
Multi-Operation-Forming-Machine Operator 2	616.685-042
Nailer, Hand	762.684-050
Nailing-Machine Operator	669.682-058
Nailing-Machine Operator, Automatic	669.685-066
Offset-Press Operator 2	651.685-018
Packager, Hand	920.587-018
Packager, Machine	920.685-078
Package Sealer, Machine	920.685-074
Painter, Brush	740.684-022
Painter, Spray 2	741.687-018
Painting-Machine Operator	599.685-074
Paint-Line Operator	599.685-066
Paint Mixer, Machine	550.485-018
Panel-Machine Operator	640.685-038
Pipe Finisher	779.684-042
Plate-Take-Out Worker	500.687-010
Plumbing-Hardware Assembler	706.684-086
Polisher	700.687-058
Polisher	705.684-058
Potato-Chip Frier	526.685-046
Pot Tender	512.685-018
Poultry Boner	525.687-066
Poultry Dresser	525.687-070
Poultry-Dressing Worker	525.687-082
Poultry Eviscerator	525.687-074
Poultry Hanger	525.687-078
Pourer, Metal	514.684-022
Presser, All-Around	363.682-014
Presser, Automatic	363.685-014
Presser, Form	363.685-018
Presser, Hand	363.684-010
Presser, Machine	363.682-018
Press Feeder	583.686-030
Press Operator	363.685-010
Pretzel Twister	520.587-010
Print Developer, Automatic	976.685-026
Processor, Grain	521.685-254
Production Helper	529.686-070
Production-Machine Tender	609.685-018
Progressive Assembler and Fitter	801.684-022
Pumper Helper	549.684-010
Punch-Press Operator 2	615.685-030
Putty Glazer	749.684-042
Quiller Operator	681.685-070
Raw-Cheese Worker	529.686-078
Reclamation Kettle Tender, Metal	512.685-022
Remelter	502.685-014
Record-Press Tender	556.685-070
Rewinder Operator	640.685-058
Riveter, Hand	709.684-066
Riveting-Machine Operator	616.685-058
Roll Finisher	920.685-090
Rope-Laying Machine Operator	681.685-086
Rope Maker, Machine	681.685-082
Rubber	742.684-010
Rubber-Mill Tender	550.685-102
Rug Cleaner	689.687-066
Sander, Hand	761.687-010
Sander, Portable Machine	761.684-034
Sausage Maker	520.685-202
Screen Printer	979.684-034
Screw-Machine Operator, Production	604.685-034
Sealing-Machine Operator	692.685-162
Seed-Cleaner Operator	599.665-010
Sewer, Hand	782.684-058
Sewing-Machine Operator, Semi-Automatic	786.685-030
Shear Operator 2	615.685-034
Shellfish-Processing-Machine Tender	529.685-214
Shellfish Shucker	521.687-122
Shirt Presser	363.685-026
Shoe Cleaner	788.687-122
Shoe Packer	920.687-166
Silk-Screen Printer	726.687-018
Sinter-Machine Operator	510.685-026
Skein-Yarn Dyer	582.685-130
Skiver, Blockers	585.685-110
Skiver, Machine	690.685-378
Slasher Operator	667.685-054
Slicing Machine Operator	521.685-306
Slitting-Machine-Operator Helper 1	699.587-010
Slubber Tender	680.685-098
Smoked Meat Preparer	525.587-014
Smoking-Pipe Liner	739.687-170
Sock Boarder	589.686-042
Solderer, Production Line	813.684-022
Spice Cleaner	521.685-322
Spinner	557.685-026
Spinner, Frame	682.685-010
Splicer	759.684-058
Spooler Operator, Automatic	681.686-018
Spooling-Machine Operator	691.685-026
Spot Cleaner	582.684-014
Spreader 1	781.687-058
Spreader, Machine	781.685-010
Spring Assembler	780.684-098
Spring Coiler	616-485-014
Stacking-Machine Operator 2	739.685-038
Stainer	742.684-014
Staple Cutter	680.685-102
Stapling-Machine Operator	692.685-202
Stenciler	781.687-066
Stenciler	920.687-178
Stone Setter	735.687-034
Stretcher-Leveler-Operator Helper	619.686-030
Strip-Cutting-Machine Operator	686.685-066
Stuffer	520.685-210
Sweeping-Compound Blender	550.685-110
Tank-House-Operator Helper	519.565-014
Tapper	514.664-014
Tenter-Frame Operator	580.585-010
Thread Cutter	789.684-050
Thread Winder, Automatic	681.685-122
Ticketer	652.685-098
Trimmer, Hand	781.687-070
Trimmer, Meat	525.684-054
Trimming-Machine Operator	583.685-122
Tumbler Operator	599.685-110
Turner	789.687-182
Twister Tender	681.685-130
Wafer-Machine Operator	526.685-066
Washer	599.687-030
Washer, Machine	361.665-010
Warp-Typing-Machine Tender	683.685-034
Welder, Gun	810.664-010
Welder, Production Line	819.684-010

Winder Operator, Automatic	681.685-150
Wireworker	728.687-010
Woodworking-Shop Hand	769.687-054
Wrapping Machine Operator	641.685-098
Wringer-Machine Operator	589.685-098
Yarn Winder	681.685-154

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Occupations in Animal Training & Service

Animal Caretaker	410.674-010
Animal Keeper	412.674-010
Animal-Ride Attendant	349.674-010
Dog Bather	418.677-010
Dog Groomer	418.674-010
Horseshoer	418.381-010
Stable Attendant	410.674-022

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Occupations in Elemental Work: Plants and Animals

Apple-Packing Header	920.687-010
Artificial Inseminator	418.384-010
Bucker	454.684-010
Cemetery Worker	406.684-010
Chick Sexer	411.687-014
Clam Sorter	446.687-010
Cowpuncher	410.674-014
Dog Catcher	379.673-010
Faller 1	454.384.010
Farm Machine Operator	409.683-010
Farmworker, Dairy	410.684-010
Farmworker, Diversified Crops 1	407.663-010
Farmworker, Fruit 1	403.683-010
Farmworker, Fruit 2	403.687-010
Farmworker, General 1	421-683-010
Farmworker, General 2	421.687-010
Farmworker, Grain 1	401.683-010
Farmworker, Grain 2	401.687-010
Farmworker, Livestock	410.664-010
Farmworker, Poultry	411.584-010
Farmworker, Rice	401.683-014
Farmworker, Vegetable 1	402.663-010
Farmworker, Vegetable 2	402.687-010
Fisher, Line	442.684-010
Fisher, Net	441.684-010
Forest-Fire Fighter	452.687-014
Forest Worker	452.687-010
Groundskeeper, Industrial-Commercial	406.684-014
Groundskeeper, Parks and Grounds	406.687-010
Growth-Nedua Mixer, Mushroom	405.683-014
Harvest Worker, Fruit	403.687-018
Horticultural Worker 1	405.684-014
Horticultural Worker 2	405.687-014
Irrigator, Gravity Flow	409.687-014
Laborer, Brush Clearing	459.687-010
Laborer, Landscape	408.687-014
Laborer, Poultry Hatchery	411.687-022
Logger, All-Round	454.684-018
Log Sorter	455.684-010
Milker, Machine	410.685-010
Packer, Agricultural Produce	920.687-134
Poultry Debeaker	411.687-026
Poultry Inseminator	411.384-010
Poultry Tender	411.364-014
Shellfish-Bed Worker	446.684-014
Sorter, Agricultural Produce	529.687-186
Teamster	919.664-010
Trapper, Animal	461.684-014
Tree Cutter	454.684-026
Tree Planter	452.687-018
Tree Pruner	408.684-018
Tree Trimmer	408.664-010
Tree-Trimmer Helper	408.667-010
Yard Worker	301.687-018

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Occupations in Elemental Work: Mechanical

Able Seaman	911.364-010
Addressing-Maching Operator	208.582-010
Automobile-Mechanic Helper	620.684-014
Automobile Wrecker	620.684-010
Baggage Handler	910.687-010
Baker Helper	313.684-010
Bartender Helper	312.687-010
Blacksmith Helper	610.684-010
Bottomer 1	932.667-010
Brake Adjuster	620.684-018
Brake Coupler, Road Freight	910.367-010
Brake Holder	932.664-010
Bull-Chain Operator	921.685-014
Caretaker	301.687-010
Car-Retarder Operator	910.382-010
Central-Supply Worker	381.687-010
Chain Offbearer	669.686-018
Choke Setter	921.687-014
Cleaner 2	919.687-014
Cleaner, Commercial or Institutional	381.687-014
Cleaner, Hospital	323.687-010
Cleaner, Housekeeping	323.687-014
Cleaner, Industrial	381.687-018
Cleaner, Laboratory Equipment	381.687-022
Cleaner, Wall	381.687-026
Cleaner, Window	389.687-014
Collator Operator	208.685-010
Company Laborer	939.687-014
Construction Worker 2	869.687-026
Cook Helper	317.687-010
Cook Helper, Pastry	313.687-010

Day Worker	301.687-014
Deli Cutter-Slicer	316.684-014
Dock Hand	891.684-010
Driller Helper	930.666-010
Dumper	921.667-018
Duplicating-Machine Operator 2	207.682-014
Electrician Helper	829.684-022
Elevator Operator, Freight	921.683-038
Elevator-Repairer Helper	825.684-014
Flagger	372.667-022
Food Assembler, Kitchen	319.484-010
Furnace Cleaner	891.687-014
Garage Servicer, Industrial	915.687-014
Garbage Collector	909.687-010
Ginner	429.685-010
Heater Helper	613.685-014
Highway-Maintenance Worker	899.684-014
Housecleaner	323.687-018
House Worker, General	301.474-010
Ironer	302.687-010
Janitor	382.664-010
Key Cutter	709.684-050
Kitchen Helper	318.687-010
Laborer	939.687-018
Laborer, Airport Maintenance	899.687-014
Laborer, Construction or Leak Gang	862.684-014
Laborer, General	909.687-014
Laborer, Hoisting	921.667-022
Laborer, Petroleum Refinery	549.687-018
Laborer, Pipe Lines	914.687-010
Laborer, Shipyard	809.687-022
Laundry Worker, Domestic	302.685-010
Light-Fixture Servicer	389.687-018
Line-Service Attendant	912.687-010
Log Loader Helper	921.687-022
Lubrication Servicer	915.687-018
Lumber Handler	922.687-070
Machinist Helper, Outside	623.687-010
Maintenance-Mechanic Helper	638.684-018
Marine Oiler	911.584-010
Material Handler	929.687-030
Millwright Helper	638.484-010
Motorboat-Mechanic Helper	623.684-010
Oiler	699.687-018
Ordinary Seaman	911.687-030
Painter Helper, Automotive	845.684-014
Painter Helper, Spray	741.687-014
Photocopying-Machine Operator	207.685-014
Photographic-Machine Operator	207.685-018
Pipe-Fitter Helper	862.684-022
Pond Worker	921.686-022
Porter, Used-Car Lot	915.687-022
Produce Weigher	299.587-010
Quarry Worker	939.667-014
Repairer Helper	630.664-010
Rigging Slinger	921.364-010
Rock-Dust Sprayer	939.687-026
Rotary-Driller Helper	930.684-026
Rug-Dyer Helper	364.687-014
Sample-Taker Operator	931.361-010
Sandblaster	503.687-010
Sandwich Maker	317.684-018
Scullion	318.687-014
Sewer-Pipe Cleaner	899.644-014
Sexton	389.667-010
Shaker Tender	934.685-018
Shipfitter Helper	806.687-050
Signal Maintainer Helper	822.684-018
Sorting-Machine Operator	208.685-030
Stevedore 2	922.687-090
Street Cleaner	955.687-018
Surveyor Helper	869.567-010
Switch Tender	910.667-026
Tank Cleaner	891.687-022
Thermal Cutter, Hand	816.684-010
Tile Setter	861.684-018
Tire Builder	750.684-022
Tire Recapper	750.685-014
Tire Repairer	915.684-010
Toy Assembler	731.684-018
Truck-Driver Helper	905.687-010
Track Repairer	910.682-010
Van-Driver Helper	905.687-014
Wastewater-Treatment-Plant Attendant	955.585-010
Water-Filter Cleaner	954.587-010
Water Tender	599.685-122
Welder Helper	819.687-014
Yard Coupler	910.664-010

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Occupations in Vending

Peddler	291.457-018
Photographer	143.457-010
Vendor	291.457-022

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Occupations in Attendant Services

Bagger Checker	357.477-010
Bagger	920.667-014
Bellhop	324.677-010
Caddie	341.677-010
Cafeteria Attendant	311.677-010
Caterer Helper	319.677-010
Checkroom Attendant	358.677-010
Counter Attendant, Cafeteria	311.677-014
Counter-Supply Worker	319.687-010
Dining Room Attendant	311-677-018
Doorkeeper	324.677-014
Elevator Operator	388.663-010
Food Service Worker, Hospital	355.677-010
Hospital Entrance Attendant	355.677-014
Hot-Room Attendant	335.677-014
Locker-Room Attendant	358.677-014
Manicurist	331.674-010
Mess Attendant	350.677-010
Porter	357.677-010
Racker	340.477-010
Restroom Attendant	358.677-018
Room-Service Clerk	324.577-010
Shoe Shiner	366.677-010
Ticket Taker	344.667-010
Usher	344.677-014

Cluster E

Researching, Planning, and Maintaining Societal Systems

Interest Areas Included

10 -- Humanitarian
11 -- Leading-Influencing

Occupations Included

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Occupations in Social Research

Anthropologist	055.067-010
Archeologist	055.067-018
Archivist	101.167-010
Ethnologist	055.067-022
Historian	052.067-022
Occupational Analyst	166.067-010
Political Scientist	051.067-010
Psychologist, Developmental	045.061-010
Psychologist, Educational	045.067-010
Psychologist, Engineering	045.061-014
Psychologist, Experimental	045.061-018
Psychologist, Industrial-Organizational	045.107-030
Psychologist, Social	045.067-014
Research Worker, Social Welfare	054.067-010
Scientific Linguist	059.067-014
Sociologist	054.067-014
Urban Planner	199.167-014

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Occupations in Law

Arbitrator	169.107-010
District Attorney	110.117-010
Judge	111.107-010
Lawyer	110.107-010
Lawyer, Admiralty	110.117-018
Lawyer, Corporation	110.117-022
Lawyer, Criminal	110.107-014
Lawyer, Patent	110.117-026
Lawyer, Real Estate	110.117-034
Tax Attorney	110.117-038

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Occupations in Finance

Accountant	160.167-010
Accountant, Budget	160.167-014
Accountant, Cost	160.167-018
Accountant, Tax	160.162-010
Appraiser	188.167-010
Auditor	160.162-014
Auditor, County or City	160.167-030
Auditor, Tax	160.167-038
Broker-and-Market Operator, Grain	162.157-010
Broker's Floor Representative	162.157-014
Budget Officer	161.117-010
Controller	186.117-014
Foreign-Exchange Trader	186.167-014
Manager, Credit, and Collection	168.167-054
Market-Research Analyst 1	050.067-014
Operations Officer	186.167-050
Reserve Officer	186.167-054
Revenue Agent	160.167-050
Risk and Insurance Manager	186.117-066
Sales Agent, Securities	251.157-010
Securities Trader 1	162.157-042
Securities Trader 2	186.167-058
Treasurer	161.117-018
Treasurer, Financial Institution	186.117-070
Trust Officer	186.117-074
Underwriter	169.167-058

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Occupations in Social Services

Case Aide	195.367-010
Caseworker	195.107-010
Christian Science Practitioner	129.107-014
Clergy Member	120.007-010
Counselor	045.107.010
Director of Counseling	045.107-018
Director of Religious Activities	129.107-018
Educational Therapist	094.227-010
Group Worker	195.164-010
Parole Officer	195.167-030
Probation Officer	195.167-034
Psychologist, Clinical	045.107-022
Psychologist, Counseling	045.107-026
Psychologist, School	045.107-034
Residence Counselor	045.107-038
Social Group Worker	195.107-022
Social Worker, Delinquency Prevention	195.107-026
Social Worker, Psychiatric	195.107-034
Social Worker, Medical	195.107-030
Social Worker, School	195.107-038
Teacher, Blind	094.227-014
Teacher, Deaf	094.224-010
Teacher, Handicapped Students	094.227-018
Teacher, Mentally Retarded	094.227-022
Veterans Contact Representative	187.167-108
Vocational-Rehabilitation Counselor	045.107-042

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Occupations in Business Administration

Administrative Assistant	169.167-010
Association Executive	189.117-010
Business Manager, College or University	186.117-010
Business Representative, Labor Union	186.167-018
Civil Preparedness Officer	188.177-022
Commissioner, Public Works	188.117-030
Dietitian, Chief	077.117-010
Director, Industrial Relations	166.117-010
Director, Operations	184.167-018
Director, Program	184.167-030
Director, Safety Council	188.167-034
Director, Service	189.167-014
Director, Sports	184.167-034
Director, Unemployment Insurance	188.117-094
District Adviser	187.117-022
Editor, Managing, Newspaper	132.017-010
Executive Chef	187.161-010
Executive Vice President, Chamber of Commerce	187.117-030
Financial-Aids Officer	090.117-030
Freight-Traffic Consultant	184.267-010
Manager, Airport	184.117-026
Manager, Benefits	166.167-018
Manager, Branch	183.117-010
Manager, Brokerage Office	186.147-034
Manager, City	188.117-114
Manager, Compensation	166.167-022
Manager, Credit Card Operations	186.167-022
Manager, Credit Union	186.167-026
Manager, Employment	166.167-030
Manager, Export	163.117-014
Manager, Financial Institution	186.117-038
Manager, Housing Project	186.167-030
Manager, Industrial Organization	189.117-022
Manager, Labor Relations	166.167-034
Manager, Merchandise	185.167-034
Manager, Office	188.167-058
Manager, Operations	184.117-050
Manager, Personnel	166.117-018
Manager, Procurement Services	162.167-022
Manager, Sales	163.167-018
Manager, Station	184.117-062
Manager, Traffic	184.167-094
Manager, Utility Sales and Service	163.167-022
Postmaster	188.167-066
President	189.117-026
President, Financial Institution	186.117-054
Purchasing Agent	162.157-038
Registrar, College or University	090.167-030
Security Officer	189.167-034
Superintendent, Division	184.167-158
Superintendent, Plant Protection	189.167-050
Supervisor, Terminal Operations	184.167-242
Vice President	189.117-034
Vice President, Financial Institution	186.117-078
Wholesaler 1	185.167-070

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Occupations in Services Administration

Academic Dean	090.117-010
Administrator, Hospital	187.117-010
Administrator, Social Welfare	195.117-010
Business-Enterprise Officer	188.117-014
Community Organization Worker	195.167-010
Curator	102.017-010
Department Head, College or University	090.167-010
Director, Athletic	090.117-022
Director, Community Organization	187.117-014
Director, Educational Program	099.117-010
Director, Institution	187.117-018
Director, Instructional Material	099.167-018
Director, Nursing Service	075.117-022
Director of Admissions	090.167-014
Director, Special Education	094.117-014
District Extension Service Agent	096.161-010
Educational Specialist	099.167-022
Extension Service Specialist	096.127-014
Field Representative	189.267-010
Library Director	100.117-010
Manager, Education and Training	166.167-026
Medical-Record Administrator	079.167-014

Park Naturalist	049.127-010
President, Educational Institution	090.117-034
Principal	099.117-018
Public Health Educator	079.117-014
Superintendent, Recreation	187.117-054
Superintendent, Schools	099.117-022
Supervisor, Education	099.117-026
Welfare Director	188.117-126

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Occupations in Promotion

Account Executive	164.167-010
Director, Fundraising	165.117-010
Fashion Coordinator	185.157-010
Foreign-Service Officer	188.117-106
Fund Raiser 1	293.157-010
Goodwill Ambassador	293.357-018
Lobbyist	165.017-010
Manager, Advertising	163.167-010
Manager, Advertising	164.117-010
Manager, Promotion	163.117-018
Membership Director	189.167-026
Public Relations Representative	165.067-010

Cluster F

Persuading, Informing, and Helping Individuals

Interest Areas Included

8 -- Selling
10 -- Humanitarian
11 -- Leading-Influencing

Occupations Included

(GOE p. 278)

Occupations in Nursing, Therapy, and Specialized Teaching Services

Art Therapist	076.127-010
Dental Hygienist	078.361-010
Emergency Medical Technician	079.374-010
Hypnotherapist	079.157-010
Industrial Therapist	076.167-010
Music Therapist	076.127-014
Nurse Anesthetist	075.371-010
Nurse, General Duty	075.374-010
Nurse, Head	075.127-018
Nurse, Instructor	075.121-010
Nurse, Licensed Practical	079.374-014
Nurse, Office	075.374-014
Nurse, Private Duty	075.374-018
Nurse, School	075.124-010
Nurse, Staff, Community Health	075.124-014
Nurse, Staff, Occupational Health Nursing	075.374-022
Nurse, Supervisor	075.127-022
Nurse, Supervisor, Community-Health Nursing	075.127-026
Occupational Therapist	076.121-010
Occupational Therapy Assistant	076.364-010
Orthoptist	079.371-014
Physical Therapist	076.121-014
Physical Therapist Assistant	076.224-010
Physician Assistant	079.364-018
Podiatric Assistant	079.374-018
Program Aide, Group Work	195.227-010
Radiologic Technologist	078.362-026
Recreational Therapist	076.124-014
Respiratory Therapist	079.361-010
Teacher, Kindergarten	092.227-014
Teacher, Preschool	092.227-018

(GOE p. 251)

Occupations in Sales Technology

Business-Opportunity and Property-Investment Broker	189.157-010
Buyer	162.157-018
Buyer, Assistant	162.157-022
Buyer, Grain	162.167-010
Commission Agent, Livestock	162.157-026
Comparison Shopper	296.367-014
Field-Contact Technician	162.117-026
Pawnbroker	191.157-010
Pharmaceutical Detailer	262.157-010
Sales Agent, Financial Services	251.257-010
Sales Agent, Insurance	250.257-010
Sales Representative, Advertising	254.357-014
Sales Representative, Aircraft Equipment and Parts	273.357-010
Sales Representative, Building Equipment and Supplies	274.357-018
Sales Representative, Chemicals and Drugs	262.357-010
Sales Representative, Construction Machinery	274.357-022
Sales Representative, Dental and Medical Equipment	276.257-010
Sales Representative, Education Courses	259.257-010
Sales Representative, Electronics Parts	271.357-010
Sales Representative, Foundry and Machine Shop Products	274.257-010
Sales Representative, Hotel Services	259.157-014
Sales Representative, Industrial Machinery	274.357-038
Sales Representative, Livestock	260.257-010
Sales Representative, Metals	274.357-054
Sales Representative, Oilfield Supplies and Equipment	274.357-058
Sales Representative, Public Utilities	253.357-010
Sales Representative, Printing	254.357-018
Sales Representative, Radio and Television Time	259.357-018
Sales Representative, Telephone Services	253.257-010
Tobacco-Warehouse Agent	259.357-038

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Occupations in Educational and Library Services

Acquisition Librarian	100.267-010
Bookmobile Librarian	100.167-014
Children's Librarian	100.167-018
Community Dietitian	077.127-010
Counselor	045.107-010
County-Agricultural Agent	096.127-010
County Home Demonstration Agent	096.121-010
Dean of Students 1	090.117-010
Dean of Students 2	091.107-010
Dietitian, Teaching	077.127-022
Director, Religious Education	129.107-022
Faculty Member, College or University	090.227-010
Four-H Club Agent	096.127-022
Home Economist	096.121-014
Instructor, Correspondence School	099.227-014
Instructor, Extension Work	090.227-018
Instructor, Physical Education	099.224-010
Instructor, Vocational Training	097.227-014
Librarian	100.127-014
Librarian, Special Collections	100.267-014
Librarian, Special Library	100.167-026
Media Specialist, School Library	100.167-030
Teacher, Adult Education	099.277-030
Teacher, Elementary School	092.227-010
Teacher, Industrial Arts	091.221-010
Teacher, Secondary School	091.227-010
Training Representative	166.227-010
Tutor	099.227-034
Young-Adult Librarian	100.167-034

(GOE p. 290)

Occupations in Social Research

City Planning Aide	199.364-010
Employment Interviewer	166.267-010
Intelligence Specialist	059.267-010
Job Analyst	166.267-018
Prisoner-Classification Interviewer	166.267-022
Research Assistant	109.267-010

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Occupations in Law

Abstractor	119.267-010
Conciliator	169.207-010
Legal Investigator	119.267-022
Paralegal Assistant	119.267-026
Appeals Referee	119.267-014

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Occupations in Communications

Columnist/Commentator	131.067-010
Director, News	184.167-014
Editorial Assistant	132.267-014
Editor, Dictionary	132.067-018
Editor, News	132.067-026
Editor, Newspaper	132.017-014
Interpreter	137.267-010
Newscaster	131.267-010
Newswriter	131.267-014
Reporter	131.267-018
Residence Supervisor	187.167-186
Translator	137.267-018
Writer, Technical Publications	131.267-026

(GOE p. 310)

Occupations in Business Management

Commissary Manager	185.167-010
Conductor, Passenger Car	198.167-010
Conductor, Road Freight	198.167-018
Director, Camp	195.167-018
Director, Food Services	187.167-026
Director, Funeral	187.167-030
Director, Recreation Center	195.167-026
Executive Housekeeper	187.167-046
Manager, Apartment House	186.167-018
Manager, Automobile Service Station	185.167-014
Manager, Barber or Beauty Shop	187.167-058
Manager, Bus Transportation	184.167-054
Manager, Cemetery	187.167-074
Manager, Distribution Warehouse	185.167-018
Manager, Food Service	187.167-106
Manager, Golf Club	187.167-114
Manager, Hotel or Motel	187.117-038
Manager, Insurance Office	186.167-034
Manager, Liquor Establishment	157.167-126
Manager, Machinery-or-Equipment Rental and Leasing	185.167-026
Manager, Meat Sales and Storage	185.167-030
Manager, Parts	185.167-038
Manager, Property	186.167-046
Manager, Recreation Establishment	187.117-042
Manager, Retail Store	185.167-046
Manager, Sales	187.167-138
Manager, Service Department	187.167-142
Manager, Skating Rink	187.167-146
Manager, Station	184.167-082
Manager, Storage Garage	187.167-150
Manager, Theater	187.167-154
Manager, Tobacco Warehouse	185.167-054
Manager, Traffic	184.117-066
Manager, Truck Terminal	184.167-110
Manager, Vehicle Leasing and Rental	187.167-162
Manager, Warehouse	184.167-114
Purser	197.167-014

Superintendent, Laundry	187.167-194
Superintendent, Maintenance of Equipment	184.167-178
Superintendent, Terminal	184.167-214
Yard Manager	184.167-278

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Occupations in Contracts and Claims

Appraiser, Automobile Damage	241.267-014
Artist's Manager	191.117-010
Booking Manager	191.117-014
Claim Adjuster	241-217-010
Claim Examiner	241.267-018
Contract Administrator	162.117-014
Contract Specialist	162.117-018
Contractor	182.167-010
Escrow Officer	119.367-010
Lease Buyer	191.117-030
Literary Agent	191.117-034
Manager, Customer Service	168.167-058
Property-Utilization Officer	188.117-122
Real-Estate Agent	186.117-058
Rental Manager, Public Events Facilities	186.117-062
Right-of-Way Agent	191.117-046
Right-of-Way Supervisor	191.117-050

Cluster G

Serving and Caring for Individuals

Interest Areas Included

3 -- Plants and Animals
4 -- Protective
9 -- Accommodating

Occupations Included

(GOE p. 262)

Occupations in Hospitality Services

Airplane-Flight Attendant	352.367-010
Braker, Passenger Train	910.364-010
Counselor, Camp	159.124-010
Guide	353.367-014
Guide, Establishment	353.367-014
Host/Hostess	352.667-010
Host/Hostess, Dance Hall	349.667-010
Recreation Leader	195.227-014
Steward/Stewardess	350.677-022

(GOE p. 281)

Occupations in Child and Adult Care

Ambulance Attendant	355.374-010
Attendant, Children's Institution	359.677-010
Birth Attendant	354.377-010
Child-Care Attendant, School	355.674-010
Child Monitor	301.677-010
Children's Tutor	099.277-010
Companion	309.677-010
Dental Assistant	079.371-010
Electrocardiograph Technician	078.362-018
Electroencephalographic Technologist	078.362-022
Foster Parent	309.677-014
Guard, School-Crossing	371.567-010
Home Attendant	354.377-014
Medical Assistant	079.367-010
Nurse Aide	355.674-014
Nurse, Practical	354.374-010
Nursery School Attendant	359.677-018
Occupational Therapy Aide	355.377-010
Orderly	355.674-018
Physical Therapy Aide	355.354-010
Playroom Attendant	359.677-026
Psychiatric Aide	355.377-014
Surgical Technician	079.374-022

(GOE p. 68

Occupations in Security Services

Border Guard	375.363-010
Detective 1	376.367-014
Fire Inspector	373.367-010
Fire Ranger	452.367-014
Park Ranger	169.167-042
Police Officer 2	375.367-010

(GOE p. 57)

Occupations in Animal Training and Service

Animal Trainer	159.224-010
Racehorse Trainer	153.224-014
Animal-Ride Manager	349.224-010

Cluster H

Maintaining Bureaucratic Rules, Records, and Transactions

Interest Areas Included

4 -- Protective
5 -- Mechanical
7 -- Business Detail
8 -- Selling
11 -- Leading-Influencing

Occupations Included

(GOE p. 308)

Occupations in Regulations Enforcement

Animal Treatment Investigator	379.263-010
Customs Inspector	168.267-022
Deputy Insurance Commissioner	186.117-022
Director, Consumer Affairs	188.117-050
Equal-Opportunity Representative	168.167-014
Fire Inspector	373.267-010
Food and Drug Inspector	168.267-042
Health Officer, Field	168.167-018
Immigration Inspector	168.167-022
Industrial Hygienist	079.161-010
Inspector, Agricultural Commodities	168.287-010
Investigator	168.267-062
Mine Inspector	168.267-074
Revenue Officer	188.167-074
Safety Coordinator	909.127-010
Safety Inspector	168.167-078
Safety Inspector	168.264-014
Sanitatarian	079.117-018
Shopping Investigator	376.267-022

(GOE p. 66)

Occupations in Safety and Law Enforcement

Detective	375.267-010
Detective Chief	375.167-022
Detective, Narcotics and Vice	375.267-014
Fire Chief	373.117-010
Fire Marshal	373.167-018
Fish and Game Warden	379.167-010
Guard, Chief	372.167-014
Harbor Master	375.167-026
Investigator, Private	376.267-018
Park Superintendent	188.167-062
Police Chief	375.117-010
Police Officer 1	375.263-014
Sheriff, Deputy	377.263-010
Special Agent	375.167-042
Special Agent-in-Charge	376.167-010
State-Highway Police Officer	375.263-018

(GOE p. 229)

Occupations in Administrative Detail

Admissions Evaluator	205.367-010
Administrative Clerk	219.362-010
Administrative Secretary	169.167-014
Attendance Officer	168.367-010
Bond Clerk	216.362-010
Budget Clerk	216.382-022
Contract Clerk	119.267-018
Court Clerk	243.362-010
Driver's License Examiner	168.267-034
Eligibility-and-Occupancy Interviewer	168.267-038
Hospital-Insurance Representative	166.267-014
Insurance Clerk 1	219.362-034
Legal Secretary	201.362-010
Loan Counselor	186.267-014
Manager, Office	169.167-034
Manager, Traffic 1	184.167-098
Manager, Traffic 1	184.167-102
Medical Secretary	201.362-014
Mortgage Clerk	249.382-010
Procurement Clerk	249.367-066
Real-Estate Clerk	219.362-046
Relocation Commissioner	188.167-070
School Secretary	201.362-022
Secretary	201.362-030
Securities Clerk	219.362-054
Social Secretary	201.162-010
Test Technician	249.367-078
Title Examiner	119.287-010
Town Clerk	243.367-018

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Occupations in Mathematical Detail

Account Analyst	214.382-010
Accounting Clerk	216.482-010
Accounting Clerk, Data Processing	216.382-010
Audit Clerk	210.382-010
Billing-Control Clerk	214.387-010
Billing Typist	214.382-014
Bookkeeper 1	210.382-014
Bookkeeper 2	210.382-018
Bookkeeping-Machine Operator 1	210.382-022
Bookkeeping-Machine Operator 2	210.382-026
Brokerage Clerk 2	219.362-018
Calculating-Machine Operator	216.482-022
Claim Examiner	168.267-014
Collection Clerk	216.362-014
Cost Clerk	216.382-034
Credit-Card Clerk	210.382-038
Demurrage Clerk	214.362-010
Documentation-Billing Clerk	214.362-014
Exchange Clerk	216.362-018
Food-and-Beverage Controller	216.362-022
Foreign Clerk	214.467-010
Insurance Clerk	214.362-022
Interest Clerk	216.382-038
Invoice-Control Clerk	214.362-026
Margin Clerk 2	216.382-046
Mortgage-Accounting Clerk	216.362-026
Payroll Clerk	215.482-010
Posting Clerk	216.587-014
Probate Clerk	216.362-030
Rater	214.482-022
Receipt-and-Report Clerk	216.382-054
Statement Clerk	219.362-058
Statistical Clerk	216.382-062
Stock-Transfer Clerk	216.382-070
Teller, Collection and Exchange	211.362-022
Timekeeper	215.367-022
Traffic Clerk	214.587-014
Traffic-Rate Clerk	214.362-038
Trust-Vault Clerk	216.367-014

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Occupations in Financial Detail

Auction Clerk	294.567-010
Cashier 1	211.362-010
Cashier 2	211.462-010
Cashier-Checker	211.462-014
Cashier, Gambling	211.462-022
Collector	241.367-010
Coupon-Redemption Clerk	290.477-010
Post-Office Clerk	243.367-014
Teller	211.362-018
Teller	211.462-034
Teller, Note	211.362-026
Ticket Agent	238.367-026
Ticket Seller	211.467-030

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Occupations in General Sales

Auctioneer	294.257-010
Building Consultant	250.357-010
Demonstrator	297.354-010
Demonstrator, Sewing Techniques	297.454-010
Driver, Sales Route	292.353-010
Driver Helper, Sales Route	292.667-010
Manufacturers' Representative	279.157-010
Sales Agent, Business Services	251.357-010
Sales Agent, Pest Control Service	251.357-018
Sales Agent, Real Estate	250.357-018
Salesperson, Automobile Accessories	273.357-030
Salesperson, Automobiles	273.353-010
Salesperson, Books	277.357-034
Salesperson, Burial Needs	279.357-042
Salesperson, China and Silverware	279.357-018
Salesperson, Corsets	261.354-010
Salesperson, Cosmetics and Toiletries	262-357-018
Salesperson, Curtains and Draperies	270.357-022
Salesperson-Demonstrator, Party Plan	279.357-038
Salesperson, Floor Coverings	270.357-026
Salesperson, Florist Supplies	275.357-054
Salesperson, Flowers	260.357-026
Salesperson, Flying Squad	279.357-046
Salesperson, Furniture	270.357-030
Salesperson, General Hardware	279.357-050
Salesperson, General Merchandise	279.357-054
Salesperson, Hearing Aids	276.354-010
Salesperson, Horticultural and Nursery Products	272.357-022
Salesperson, Household Appliances	270.357-034
Salesperson, Infants' and Children's Wear	261.357-046
Salesperson, Jewelry	279-357-058
Salesperson, Men's and Boys' Clothing	261.357-050
Salesperson, Men's Furnishings	261.357-054
Salesperson, Millinery	261.357-058
Salesperson, Musical Instruments and Accessories	277.357-038
Salesperson, Parts	279.357-062
Salesperson, Pets and Pet Supplies	277.357-042
Salesperson, Photographic Supplies and Equipment	277.357-050
Salesperson, Shoes	261.357-062
Salesperson, Sporting Goods	277.357-058
Salesperson, Stereo Equipment	270.357-038
Salesperson, Trailers and Motor Homes	273.357-034
Salesperson, Women's Apparel and Accessories	261.357-066
Salesperson, Yard Goods	261.357-070
Sales Representative, Apparel Trimmings	261.357-010
Sales Representative, Architectural and Engineering	276.357-010
Sales Representative, Barber and Beauty Equipment	275.357-010
Sales Representative, Bottles and Bottling Equipment	274.357-014

Sales Representative, Canvas Products	261.357-014
Sales Representative, Commercial Equipment and Supplies	275.357-018
Sales Representative, Door-to-Door	291.357-010
Sales Representative, Farm and Garden Equipment	272.357-014
Sales Representative, Food Products	260.357-014
Sales Representative, Footwear	261.357-018
Sales Representative, General Merchandise	279.357-014
Sales Representative, Hardware Supplies	274.357-034
Sales Representative, Hobbies and Crafts	277.357-010
Sales Representative, Home Furnishings	270.357-010
Sales Representative, Hotel and Restaurant Equipment	275.357-026
Sales Representative, Household Appliances	270.357-014
Sales Representative, Industrial Rubber Goods	274.357-042
Sales Representative, Jewelry	279.357-018
Sales Representative, Material-Handling Equipment	274.357-050
Sales Representative, Men's and Boys' Apparel	261.357-022
Sales Representative, Motor Vehicles and Supplies	273.357-022
Sales Representative, Musical Instruments and Accessories	277.357-014
Sales Representative, Novelties	277.357-018
Sales Representative, Paper and Paper Products	279.357-026
Sales Representative, Petroleum Products	269.357-014
Sales Representative, Plastic Products	279.357-030
Sales Representative, Publications	277.357-022
Sales Representative, Recreation and Sporting Goods	277.357-026
Sales Representative, School Equipment and Supplies	275.357-042
Sales Representative, Textile Designs	274.357-066
Sales Representative, Tobacco Products and Smoking	260.357-022
Sales Representative, Toilet Preparations	262.357-014
Sales Representative, Upholstery and Furniture	259.357-026
Sales Representative, Women's and Girls' Apparel	261.357-038
Superintendent, Sales	250.157-010
Telephone Solicitor	299.357-014
Travel Agent	252.157-010
Wedding Consultant	299.357-018

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Occupations in Materials Control

Cargo Checker	222.367-010
Complaint Clerk	221.387-014
Custodian, Athletic Equipment	969.367-010
Electronics Utility Worker	726.361-010
Estimator, Printing	221.367-014
Inventory Clerk	222.387-026
Job Tracer	221.387-034
Laundry Worker 3	369.387-010
Linen-Room Attendant	222.387-030
Material Clerk	222.387-034
Material Coordinator	221.167-014
Material Expediter	221.367-042
Order Detailer	221.387-046
Order Filler	222.487-014
Parts-Order-and-Stock Clerk	249.367-058
Pharmacy Helper	074.387-010
Production Coordinator	221.167-018
Sales Correspondent	221.367-062
Shipping and Receiving Clerk	222.387-050
Sorter-Pricer	222.387-054
Stock Clerk	222.387-058
Stock, Clerk, Self-Service Store	299.367-014
Tool-Crib Attendant	222.367-062

Cluster I

Processing Information

Interest Areas Included

7 -- Business Detail
11 -- Leading-Influencing

Occupations Included

(GOE p. 237)

Occupations in Oral Communications

Airline-Radio Operator	193.262-010
Central-Office Operator	235.462-010
Charge-Account Clerk	205.367-014
Civil-Service Clerk	205.362-010
Classified-Ad Clerk 1	247.367-010
Collection Clerk	241.357-010
Communication-Center Operator	235.662-014
Correspondence Clerk	209.262-010
Credit Clerk	205.367-022
Customer Service Representative	959.361-010
Directory-Assistance Operator	235.662-018
Dispatcher	193.262-014
Dispatcher	932.167-010
Dispatcher, Bus and Trolley	913.167-014
Dispatcher, Maintenance Service	239.367-014
Dispatcher, Radio	379.362-010
Dispatcher, Service	959.167-010
Dispatcher, Ship Pilot	248.367-026
Dispatcher, Traffic or System	919.162-010
Election Clerk	205.367-030
Employment-and-Claims Aide	169.367-010
EmploymentClerk	205.362-014
Fire Lookout	452.367-010
Hotel Clerk	238.362-010
Information Clerk	237.367-018
Information Clerk	237.367-022
License Clerk	205.367-034
Loan Interviewer	241.367-018
Order Clerk, Food and Beverage	209.567-014
Police Aide	243.362-014
Policyholder-Information Clerk	249.262-010
Public Health Register	169.167-046
Radio Officer	193.262-022
Receptionist	237.367-038
Recreation-Facility Attendant	341-367-010
Registration Clerk	205.367-042
Reservations Agent	238.367-018
Service Clerk	221.367-070
Skip Tracer	241.367-026
Survey Worker	205.367-054
Taxicab Starter	913.367-010
Telegrapher	236.562-010
Telephone-Answering-Service Operator	235.662-026
Telephone Operator	235.662-022
Train Dispatcher	184.167-262
Travel Clerk	238.367-030

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Occupations in Records Processing

Aircraft-Log Clerk	221.362-010
Assignment Clerk	215.367-010
Checker 2	209.687-010
Circulation Clerk	209.362-010
Claims Clerks 1	241.362-010
Classification Clerk	206.387-010
Classified-Ad Clerk 2	247.387-022
Coding Clerk	209.387-010
Compiler	209.387-014
Control Clerk, Auditing	209.362-014
Control Clerk, Data Processing 1	221.382-014
Correspondence-Review Clerk	209.367-018
Credit Authorizer	249.367-022
Crew Scheduler	215.362-010
Customer-Complaint Clerk	241.367-014
Diet Clerk	245.587-010
Disbursement Clerk	209.367-022
Dispatcher, Motor Vehicle	249.167-014
Expediter	222.367-018
File Clerk 2	206.367-014
Insurance Checker	219.482-014
Insurance Clerk 1	219.387-014
Insurance Clerk 2	205.567-010
Mail Carrier	230.367-010
Mail Clerk	209.587-026
Mail Handler	209.687-014
Medical-Record Clerk	245.362-010
Medical Record Technician	079.367-014
Messenger, Bank	230.367-014
Order Clerk	249.367-054
Parcel-Post Clerk	222.387-038
Personnel Clerk	209.363-026

Proofreader	209.387-030
Property Clerk	222.367-054
Reservation Clerk	238.362-014
Reservation Clerk	238.367-014
Route-Delivery Clerk	222.587-034
Scheduler, Maintenance	221.367-066
Shipping-Ordering Clerk	219.367-030
Shorthand Reporter	202.362-010
Stenographer	202.362-014
Stenotype Operator	202.362-022
Stock-Control Clerk	219.367-034
Tape Librarian	206.387-030
Title Searcher	209.367-046
Traffic Clerk	221.367-078
Train Clerk	219.462-014
Transportation Agent	912.367-014
Travel Counselor, Automobile Club	238.167-014
Yard Clerk	209.367-054

(GOE p. 287)

Occupations in Educational and Library Services

Catalog Librarian	100.387-010
Classifier	100.367-014
Film-or-Tape Librarian	222.367-026
Homemaker	309.354-010
Library Assistant	249.367-046
Music Librarian	100.367-022
Teacher Aide 1	099.327-034
Bibliographer	100.367-010
Career-Guidance Technician	249.367-014
Film Rental Clerk	295.367-018

Cluster J

Manipulating Records

Interest Areas Included

5 -- Mechanical
7 -- Business Detail

Occupations Included

(GOE p. 245)

Occupations in Clerical Machine Operation

Adding-Machine Operator	216.482-014
Billing-Machine Operator	214.482-010
Clerk-Typist	203.362-010
Computer Operator	213.362-010
Computer-Peripheral-Equipment Operator	213.382-010
Data Typist	203.582-022
Food Checker	211.482-014
Keypunch Operator	203.582-030
Linotype Operator	650.582-010
Magnetic-Tape-Typewriter Operator	203.582-034
Monotype-Keyboard Operator	650.582-014
Phototypesetter Operator	650.582-022
Proof-Machine Operator	217.382-010
Tabulating-Machine Operator	213.682-010
Telegraphic-Typewriter Operator	203.582-050
Transcribing-Machine Operator	203.582-058
Transit Clerk	217.382-014
Typesetter-Perforator Operator	203.582-062
Typist	203.582-066
Varitype Operator	203.382-026
Verifier Operator	203.582-070

(GOE p. 247)

Occupations in Clerical Handling

Addresser	209.587-010
Advertising-Material Distributor	230.687-010
Checker 1	222.687-010
Clerk, General	209.562-010
Collator	653.687-010
Deliverer, Outside	230.667-010
Distributing Clerk	222.587-018
File Clerk 1	206.362-010
Messenger, Copy	239.677-010
Office Helper	239.567-010
Page	249.687-014
Routing Clerk	222-687-022
Sorter	209.687-022
Teacher Aide 2	249.367-074

(GOE p. 110)

Occupations in Materials Control

Chart Changer	221.584-010
Kitchen Clerk	222.587-022
Laboratory Clerk	222.587-026
Mailer	222.587-030
Marker	209.587-034
Meter Reader	209.567-010
Tallier	221.587-030
Ticketer	229.587-018

Cluster K

Performing

Interest Areas Included

1 -- Artistic

Occupations Included

Sub-cluster K-1: Verbal arts

Occupations in Performing Arts: Music

(GOE p. 23)

Arranger	152.067-101
Choral Director	152.047-010
Conductor, Orchestra	152.047-014
Composer	152.067-014
Musician, Instrumental	152.041-010
Singer	152.047-022
Teacher, Music	152.021-010

(GOE p. 16)

Occupations in Literary Arts

Copy Writer	131.067-014
Critic	131.067-018
Editor, Book	132.067-014
Editorial Writer	131.067-022
Playwright	131.067-038
Writer, Prose, Fiction and Nonfiction	131.067-046

Occupations in Performing Arts: Drama

(GOE p. 21)

Actor	150.047-010
Announcer	159.147-010
Comedian	159.047-014
Director, Motion Picture	159.067-010
Director, Stage	150.067-010
Disk Jockey	159.147-014
Dramatic Coach	150.027-010
Producer	159.117-010
Teacher, Drama	150.027-014

Sub-cluster K-2: Spatial arts

(GOE p. 18)

Occupations in Visual Arts

Audiovisual Production Specialist	149.061-010
Cartoonist	141.061-010
Cloth Designer	142.061-014
Clothes Designer	142.061-018
Commercial Designer	141.081-014
Creative Director	141.067-010
Displayer, Merchandise	298.081-010
Fashion Artist	141.061-014
Floral Designer	142.081-010
Fur Designer	142.081-014
Graphic Designer	141.061-018
Illustrator	141.061-022
Illustrator, Medical and Scientific	141.061-026
Industrial Designer	142.061-026
Interior Designer	142.051-014
Memorial Designer	142.061-030
Painter	144.061-010
Photographer Helper	976.667-010
Photographer, Motion Picture	143.062-022
Photographer, Still	143.062-030
Photojournalist	143.062-034
Sculptor	144.061-018
Set Decorator	142.061-042
Set Designer	142.061-050
Teacher, Art	149.021-010

Occupations in Performing Arts: Dance

(GOE p. 26)

Choreographer	151.027-010
Dancer	151.047-010
Instructor, Dancing	151.027-014

Appendix F

Specific Aptitude Test Batteries (SATBs)

This appendix shows the SATBs published by the Employment Service (U.S. Department of Labor, 1980b). The occupations have been reordered according to the OAP cluster to which they were assigned in the present report (using the GOE code in the last column together with Table 5).

See the foregoing reference for additional information about SATBs.

Aptitudes used in SATBs

G - Intelligence
V - Verbal aptitude
N - Numerical aptitude
S - Spatial aptitude
P - Form perception
Q - Clerical perception
K - Motor coordination
F - Finger dexterity
M - Manual dexterity

Cluster A: Researching, designing, and modifying physical systems

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
213	MATHEMATICIAN	020.067-014	X	130		120	120						02.01.01
283	BIOLOGIST	041.061-030	X			110	105		110				02.02.03
039	GENERAL PRACTITIONER	070.101-022	X	125	115	110	110						02.03.01
399	OSTEOPATHIC PHYSICIAN	071.101-010	X	105	110	110							02.03.01
049	DENTIST	072.101-010	X	115			110	100			85		02.03.02
058	VETERINARIAN	073.101-010	X	110			105			100			02.03.03
315	SYSTEMS ANALYST, ELECTRONIC DATA PROCESSING	012.167-066	X	120	105	110	105						11.01.01
314	PROGRAMER, BUSINESS	020.162-014	X	115	105	110	105						11.01.01
316	PROGRAMER, ENGINEERING AND SCIENTIFIC	020.167-022	X	125	110	110	105						11.01.01
322	ELECTRICAL TECHNICIAN	003.161-010	X	115	100	95	110						05.01.01
373R	ELECTRICAL TECHNICIAN	003.161-010	X			90	115	95					05.01.01
373R	ELECTRONICS TECHNICIAN	003.161-014	X			90	115	95					05.01.01
293R	ELECTRONICS TECHNICIAN	003.161-014	X			105	100	90					05.01.01
373R	MECHANICAL-ENGINEERING TECHNICIAN	007.161-026	X			90	115	95					05.01.01
431	TOOL PROGRAMER, NUMERICAL CONTROL	007.167-018	X	105	105	100							05.01.06
036	CIVIL ENGINEER	005.061-014	X	125		115	115						05.01.07
036	CHEMICAL ENGINEER	008.061-018	X	125		115	115						05.01.07
036	ELECTRICAL ENGINEER	003.061-010	X	125		115	115						05.01.08
036	MECHANICAL ENGINEER	007.061-014	X	125		115	115						05.01.08

Cluster B: Operating and testing physical systems

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
339	CHIEF OF PARTY	018.167-010	X			110	100		95	80			05.03.01
266R74	DRAFTER, CIVIL	005.281-010		85		100	100		90				05.03.02
266R74	DRAFTER, STRUCTURAL	005.281-014		85		100	100		90				05.03.02
266R74	DRAFTER, MECHANICAL	007.281-010		85		100	100		90				05.03.02
373R	ENGINEERING ASSISTANT, MECHANICAL EQUIPMENT	007.161-018	X			90	115	95					05.03.02
266R74	DRAFTER, GEOLOGICAL	010.281-014		85		100	100		90				05.03.02
256	AIR-TRAFFIC-CONTROL SPECIALIST, TOWER	193.162-018	X	110	100	110		85					05.03.03
324	METALLURGICAL TECHNICIAN	011.261-010	X	115		110	100						02.04.01
378	METALLURGICAL TECHNICIAN	011-261.010	X		95	105	95						02.04.01
327R78	PSYCHIATRIC TECHNICIAN	079.367-022					70		85	80	70		02.04.01
387	PHARMACY TECHNICIAN	079.377-010	X		100	105		100	105				02.04.01
156	MEDICAL TECHNOLOGIST	078.361-014	X	110	110			105	110				02.04.02
384	MEDICAL-LABORATORY TECHNICIAN	078.381-014	X			100	110		110				02.04.02
093	EMBALMER	338.371-014	X	100	95	105							02.04.02

Cluster C: Crafting, assembling, repairing, inspecting, and setting up or operating equipment (Sub-cluster C-1: Spatial orientation)

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
390	LOG SCALER	455.487-010	X			90		80		75			05.07.06
367	GUIDE SETTER	613.361-010						95		80		105	06.01.02
370R75	MULTI-OPERATION-FORMING-MACHINE SETTER	616.260-014				75	75				80		06.01.02
406	MACHINE SETTER	616.360-022						80	90			90	06.01.02
394	ENVELOPE-FOLDING-MACHINE ADJUSTER	641.680-010					75	85		80			06.01.02
370R75	MACHINE SET-UP OPERATOR, PAPER GOODS	649.380-010				75	75				80		06.01.02
153	LOOM FIXER	683.260-018	X			70		75				75	06.01.02
091R	KNITTING-MACHINE FIXER	689.280-014	X			75	80				75		06.01.02
133	FIRESETTER	692.360-018	X	80						80		90	06.01.02
140R	STRIPPER	971.381-050				85	90	95					01.06.01
222R	PROCESS ARTIST	972.281-010					90		95	80			01.06.01
224R	LITHOGRAPHIC PLATE MAKER	972.381-010	X				100		90				01.06.01
223R	PHOTOGRAPHER, LITHOGRAPHIC	972 382-014				90	85	95		85			01.06.01
215R	CEMENT MASON	844.364-010				70	70					85	05.05.01
107R	BRICKLAYER	861.381-018				85	90	90		85			05.05.01
011R	CARPENTER	860 381-022	X			80	85			70		80	05.05.02
061R78	PIPE FITTER	862.381-018			90			95				85	05.05.03
061R78	PLUMBER	862.381-030			90			95				85	05.05.03
240	PLASTERER	842.361-018				80		85				100	05.05.04
154R	LINE REPAIRER	821.361-026					90			70			05.05.05
074R77	CENTRAL-OFFICE REPAIRER	822.281-014				90	95	85		85			05.05.05
189	MAINTENANCE MECHANIC, TELEPHONE	822.281-018	X		80		100				75		05.05.05
072R77	ELECTRICIAN	824.261-010		90		85	95					100	05.05.05
069R	ELECTRICIAN, AIRPLANE	825.281-018	X			85	80			75			05.05.05

Cluster C-1 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
235	METAL FABRICATOR	619.360-014	X				90	70			70	85	05.05.06
177R	MILLWRIGHT	638.281-018	X			70	85					75	05.05.06
307R	DIE MAKER	739.381-018	X			80	90					90	05.05.06
280	STRUCTURAL-STEEL WORKER	801.361-014	X				85	80	90			85	05.05.06
082R	SHEET-METAL WORKER	804.281-010	X				90		80	75		95	05.05.06
262R	BOILERMAKER I	805.261.014				70	80		70			70	05.05.06
045R	SHIPFITTER	806.381-046	X				105	75				85	05.05.06
313	AUTOMOBILE-BODY REPAIRER	807.381-010	X				85	90				90	05.05.06
344R	LAY-OUT WORKER I	809.281-010	X				100	95	90				05.05.06
280	ORNAMENTAL-IRON WORKER	809.381-022	X				85	80	90			85	05.05.06
207	WELDER, ARC	810.384-014	X	70			80	80					05.05.06
211	WELDER, ARC	810.384-014	X				85					85	05.05.06
126	WELDER, COMBINATION	819.384-010					85				85	80	05.05.06
012R	MACHINIST	600.280-022	X			80	80					80	05.05.07
132	PATTERNMAKER, METAL	600.280-050	X			90	100	80					05.05.07
212R	TOOL-AND-DIE MAKER	601.280-046	X			95	100	90					05.05.07
448	MODEL MAKER	693.361-010	X				90	75				90	05.05.07
100R	CABINETMAKER	660.280-010	X			85	105					85	05.05.08
132	PATTERNMAKER, WOOD	661.281-022	X			90	100	80					05.05.08
144R76	MACHINIST, WOOD	669.380-014		75			75					75	05.05.08
043R	AUTOMOBILE MECHANIC	620.261-010	X			75	95					90	05.05.09
380	AUTOMOBILE MECHANIC	620.261-010	X				90	80			80		05.05.09
201R	CONSTRUCTION-EQUIPMENT MECHANIC	620.261.022	X			75	85				75		05.05.09
455	CONSTRUCTION-EQUIPMENT MECHANIC	620.261-022					70		90			80	05.05.09
111R	AIRFRAME-AND-POWER-PLANT MECHANIC	621.281-014	X			90	100				85		05.05.09

Cluster C-1 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002 G	V	N	S	P	Q	K	F	M	GOE CODE
423R	DIESEL MECHANIC	625.281-010	X			95	105			90		100	05.05.09
331	SMALL-ENGINE MECHANIC	625.281-034	X			85	95				80		05.05.09
234	CASH-REGISTER SERVICER	633.281-010	X				90	85		80		85	05.05.09
234	OFFICE-MACHINE SERVICER	633.281-018	X				90	85		80		85	05.05.09
413R	ENVIRONMENTAL-CONTROL-SYSTEM INSTALLER-SERVICER	637.261-014	X			100			95			85	05.05.09
445	MACHINERY ERECTOR	638.261-014	X			75	90					75	05.05.09
177R	MANUFACTURER'S SERVICE REPRESENTATIVE	638.261-018	X			70	85					75	05.05.09
183	MANUFACTURER'S SERVICE REPRESENTATIVE	638.261-018	X	95			85					85	05.05.09
157R	MAINTENANCE MECHANIC	638.281-014	X				70			80	90	100	05.05.09
370R75	MAINTENANCE MECHANIC	638.281-014				75	75				80		05.05.09
439R	MAINTENANCE MECHANIC	638.281-014	X				85	70				90	05.05.09
318R	INSTRUMENT MECHANIC	710.281-026	X			85	100	80					05.05.10
103R	ELECTRONICS MECHANIC	828.281.010	X				105	90				70	05.05.10
415	ELECTRONICS MECHANIC	828.281-010	X	110		95	100						05.05.10
463	ELECTRONICS MECHANIC	828.281-010	X			95	100				75	100	05.05.10
285	DENTAL-LABORATORY TECHNICIAN	712.381-018	X				80	80		80		85	05.05.11
418	DENTAL CERAMIST, ASSISTANT	712.664-020						70	95			75	05.05.11
430	FINISHER, DENTURE	712.681-018	X			85		95				85	05.05.11
151	WATCH REPAIRER	715.281-010	X				85	90			90		05.05.11
333	EXPERIMENTAL ASSEMBLER	739.381-026	X		85			75		75	80		06.05.11
345	GLASS BLOWER, LABORATORY APPARATUS	772.281-010	X				95	95				95	05.05.11
354	WEB-PRESS OPERATOR	651.362-030							80	85		70	05.05.13
040R	OFFSET-PRESS OPERATOR I	651.482-010				85	85	85					05.05.13
059	DRESSMAKER	785.361-010					85	90			85		05.05.15
238R	COOK	313.361-014	X				85	90			70	70	05.05.17

F-6

Cluster C-1 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002 G	V	N	S	P	Q	K	F	M	GOE CODE
124	TANK-TRUCK DRIVER	903.683.018	X	85	80	90			80				05.08.01
124	TRACTOR-TRAILER-TRUCK DRIVER	904.383-010	X	85	80	90			80				05.08.01
375R	LATHER	842.361-010				80	85					75	05.10.01
185	CARPET LAYER	864.381-010				85	95					80	05.10.01
185	FLOOR LAYER	864.481-010				85	95					80	05.10.01
171R	GLAZIER	865.381-010				80	105	75					05.10.01
241	ROOFER	866.381-010						70		70		80	05.10.01
208	GAS-APPLIANCE SERVICER	637.261-018	X	90		80		70					05.10.02
319R	SEWING-MACHINE REPAIRER	639.281-018	X				70					85	05.10.02
076R	AIRCRAFT MECHANIC, PLUMBING AND HYDRAULICS	862.381-010					70	70			80	90	05.10.02
113R	RADIO REPAIRER	720.281-010	X			80	95				80		05.10.03
113R	TELEVISION-AND-RADIO REPAIRER	720.281-018	X			80	95				80		05.10.03
284	PINSETTER MECHANIC, AUTOMATIC	638.261-022	X			85	85				80		05.10.04
362	THERMAL CUTTER, HAND I	816.464-010						105				95	05.10.04
363R	MAINTENANCE REPAIRER, FACTORY OR MILL	899.281-014					80		90			85	05.10.04
444	PHOTOGRAPH FINISHER	976.487-010	X		90			75					05.10.05
203	PAINTER	840.381-010				90	100				80	80	05.10.07
402	PAINTER, TRANSPORTATION EQUIPMENT	845.381-014	X				80			90		80	05.10.07
343R	OPERATING ENGINEER	859.683-010				75	80			75			05.11.01
368	STRAIGHTENING-PRESS OPERATOR	617.482-026	X			90			100			95	05.11.04
068	REFINERY OPERATOR	549.260-010	X	85				65		70		65	06.01.03
330R	CHEMICAL OPERATOR III	559.382-018	X			75	75				85		06.01.03
033	TURRET-LATHE SET-UP OPERATOR, TOOL	604.280-022	X	80			80	85				80	06.01.03
453	SCREW-MACHINE SET-UP OPERATOR, PRODUCTION	604.380-022	X			80	90					75	06.01.03

Cluster C-1 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
098	ROLLING-MILL OPERATOR	613.462-018					80	80			85	85	06.01.03
257	MULTI-OPERATION-FORMING- MACHINE OPERATOR I	616.360-026					75	70			75		06.01.03
366	MOLDER	518.361-010	X			90		100				85	06.01.04
143	RING MAKER	700.381-042						80				75	06.01.04
081	ASSEMBLER	710.681-010								85	80	85	06.01.04
129	ASSEMBLER	710.681-010					90				95	90	06.01.04
253	ASSEMBLER	710.681-010					80				95	85	06.01.04
151	BANKING PIN ADJUSTER	715.381-018	X				85	90			90		06.01.04
008	TUBE ASSEMBLER, ELECTRON	725.384-010						85		85	85	80	06.01.04
117	TUBE ASSEMBLER, ELECTRON	725.384-010						90			85	100	06.01.04
392	TUBE ASSEMBLER, ELECTRON	725.384-010	X	75						100	90	80	06.01.04
069R	AIRCRAFT MECHANIC, ARMAMENT	806.381-010	X			85	80			75			06.01.04
076R	AIRCRAFT MECHANIC, RIGGING AND CONTROLS	806.381-018					70	70			80	90	06.01.04
076R	ASSEMBLER, AIRCRAFT, STRUCTURES AND SURFACES	806.381-026					70	70			80	90	06.01.04
461	ASSEMBLER AND WIRER, INDUSTRIAL EQUIPMENT	826.361-010						75		85	80	80	06.01.04
355	INSPECTOR, MECHANICAL AND ELECTRICAL	710.381-038	X			95	90					80	06.01.05
151	INSPECTOR, HAIRSPRING I	715.381-066	X				85	90			90		06.01.05
151	INSPECTOR, WATCH TRAIN	715.381-074	X				85	90			90		06.01.05
149	FINAL INSPECTOR, MOVEMENT ASSEMBLY	715.684-094								95	85	90	06.01.05
151	INSPECTOR, TIMING	715.685-034	X				85	90			90		06.01.05
277	PROCESS INSPECTOR	736.381-018	X			100	100	95					06.01.05
404	INSPECTOR, ASSEMBLIES AND INSTALLATIONS	806.281-022	X	100					95	80			06.01.05
071R	COSMETOLOGIST	332.271-010	X				90	80	95			75	09.02.01
252R	BARBER	330.371-010						80		85	90		09.02.02

Sub-cluster C-2: Quick, accurate manipulation

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
358R	OFFSET-DUPLICATING-MACHINE OPERATOR	207.682-018						75			80	90	05.10.05
086	PRINTER OPERATOR, BLACK-AND-WHITE	976.682-014						85		90		100	05.10.05
152	BURRER, MACHINE	603.685-046					85	90		80		75	06.02.02
257	CUT-OFF-SAW OPERATOR, METAL	607.682-010					75	70			75		06.02.02
367	SCREWDOWN OPERATOR	613.382-018						95		80		105	06.02.02
257	STRAIGHTENING-ROLL OPERATOR	613.462-022					75	70			75		06.02.02
044	PUNCH-PRESS OPERATOR I	615.482-022						75				90	06.02.02
098	SLITTING-MACHINE OPERATOR II	615.662-010					80	80			85	85	06.02.02
368	BRIDGE-OR-GANTRY-CRANE OPERATOR	921.663-010	X			90			100			95	06.02.02
152	DRILLING-MACHINE OPERATOR, AUTOMATIC	606.685-030					85	90		80		75	06.02.03
300R	CYLINDER-DIE-MACHINE OPERATOR	649.682-014	X			70	90	70					06.02.04
073	FOLDING-MACHINE OPERATOR	649.685-046					90		85	80	75		06.02.04
172	FOLDING-MACHINE OPERATOR	653.382-010		85		90			85				06.02.04
369	PRINTER-SLOTTER OPERATOR	659.662-010						75			80	85	06.02.04
159	STITCHER, STANDARD MACHINE	690.682.082						80		80		85	06.02.05
289	STITCHER, STANDARD MACHINE	690.682-082							85	95	70		06.02.05
004	GLOVE SEWER	784.682-010						75		75	80	75	06.02.05
004	HAT-AND-CAP SEWER	784.682-014						75		75	80	75	06.02.05
078	SEWING-MACHINE OPERATOR	787.682-074						80		90	80	80	06.02.05
405	LEVERS-LACE MACHINE OPERATOR	683.682-026						85		80		90	06.02.06
115R76	WEAVER	683.682-038						75				95	06.02.06

Cluster C-2 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
125	SEAMLESS-HOSIERY KNITTER	684.685-010					70				90	75	06.02.06
442	WARP-KNITTING-MACHINE OPERATOR	685.665-018						70			70	85	06.02.06
119	LOOPER	689.682-010	X				75				85	75	06.02.06
190	LOOPER	689.682-010								95	105	95	06.02.06
334	PRECISION-LENS GRINDER	716.382-018	X				95	80				75	06.02.08
371R	FLEXOGRAPHIC-PRESS OPERATOR	651.682-010					90	70				90	06.02.09
335R76	EXTRUDING-MACHINE OPERATOR	691.382-010						80	85		85		06.02.09
308	INSULATING-MACHINE OPERATOR	691.682-018						80		85		80	06.02.09
123	DIE CUTTER	699.682-022					75					80	06.02.09
401	HEAT TREATER I	504.382-014						80	90			70	06.02.10
401	HEAT TREATER II	504.682-018						80	90			70	06.02.10
098	COLD-MILL OPERATOR	613.462-010					80	80			85	85	06.02.10
367	MANIPULATOR	613.682-010						95		80		105	06.02.10
214	WIRE DRAWER	614.382-014						85	95			80	06.02.10
342R	WATER-TREATMENT-PLANT OPERATOR	551.485-010	X	90		85			80				06.02.11
396	BLOW-MOLDING MACHINE OPERATOR	556.682-010	X	85				85	95				06.02.13
221	EXTRUDER OPERATOR	557.382-010							90	85		100	06.02.13
170	FORMING-MACHINE OPERATOR	575.382-014	X	90		100					70	95	06.02.13
428	BACK TENDER, PAPER MACHINE	534.662-010	X			80	75		95				06.02.14
428	FOURDRINIER-MACHINE TENDER	539.362-014	X			80	75		95				06.02.14
085R	BAKER	526.381-010	X				70		80		75		06.02.15
076R	ASSEMBLER, AIRCRAFT POWER PLANT	806.381-022					70	70			80	90	06.02.22

Cluster C-2 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
288	TRAILER ASSEMBLER	806 381-058	X	80			75	70					06.02.22
013	ASSEMBLER, INTERNAL COMBUSTION ENGINE	806.481-014						80		75	75	85	06.02.22
408	CABLE SWAGER	806.684-042	X	75					95		85		06.02.22
102	APPLIANCE ASSEMBLER, LINE	827.684-010	X	85								75	06.02.22
151	BALANCE ASSEMBLER	715.384-010	X				85	90			90		06.02.23
149	DIALER	715.684-086								95	85	90	06.02.23
150	PUT-IN-BEAT ADJUSTER	715.684-174					90				85	85	06.02.23
191	ASSEMBLER I	723.684-014						80			85	100	06.02.23
173	ELECTRONICS ASSEMBLER	726.684-018						100	100	105			06.02.23
229	ELECTRONICS ASSEMBLER	726.684-018							85		90	110	06.02.23
245	ELECTRONICS ASSEMBLER	726.684-018								100	95	110	06.02.23
281R	ELECTRONICS ASSEMBLER	726.684-018	X			80			95	75			06.02.23
304	ELECTRONICS ASSEMBLER	726.684-018	X	70			85			90			06.02.23
310R74	ELECTRONICS ASSEMBLER	726.684-018					70	90	95			90	06.02.23
381R76	ELECTRONICS ASSEMBLER	726-684.018						75	95	100			06.02.23
467R78	ELECTRONICS ASSEMBLER	726.684-018							75		85	90	06.02.23
024	FUSE ASSEMBLER	737.684-022						95		85	80	80	06.02.23
152	BURRER	715.684-042					85	90		80		75	06.02.24
057	UPHOLSTERER, INSIDE	780.681-010	X				80			75	75	85	06.02.27
075	MENDER	782.684-042						85		90	75	85	06.02.27
267R	TIRE BUILDER, AUTOMOBILE	750.384-010	X				95	80				80	06.02.29
279	PROCESSOR, SOLID PROPELLANT	590.464-010						70	80			85	06.02.32

Cluster C-2 -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002 G	V	N	S	P	Q	K	F	M	GOE CODE
160	CABLE MAKER	728.684-010	X	90				85	90		80		06.02.32
407	QUALITY-CONTROL TECHNICIAN	529.387-030	X			95		110			90		06.03.01
118	EGG CANDLER	529.687-074						80		85		100	06.03.01
097	INSPECTOR	619.381-010	X	75		75	85					80	06.03.01
258	INSPECTOR	774.364-010						75		85		75	06.03.01
260	ASSEMBLER	369.687-010								80		80	06.03.02
468R78	CIGARETTE INSPECTOR	529.567-010						80	80		70		06.03.02
112	TILE SORTER	573.687-038						70			70	80	06.03.02
178	SELECTOR	579.687-030						75	95	80			06.03.02
192	SELECTOR	579.687-030							75	80		100	06.03.02
104	PAPER SORTER AND COUNTER	649.687-010						80		90	75	80	06.03.02
065	STOCKING INSPECTOR	684.684-010							90	90		85	06.03.02
060	PAIRER	684.687-010						90			90	75	06.03.02
075	BURLER	689.684-010						85		90	75	85	06.03.02
412	TOOTH INSPECTOR	712.687-038					75	85		90			06.03.02
149	INSPECTOR, CASING	715.687-062								95	85	90	06.03.02
443	RUBBER-GOODS INSPECTOR-TESTER	759.684-010							90	85		85	06.03.02
464	TAPER	842.664-010						80			70	75	05.10.01
364	CONSTRUCTION WORKER I	869.664-014						95			75	85	05.10.01
432R	CONSTRUCTION WORKER I	869.664-014				75						85	05.10.01
349R	MEAT CUTTER	316.684-018	X				85	80				85	05.10.08

Cluster D: Tending (machines, buildings, plants, animals) and attending (workers, the public)

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
135R76	PRODUCTION-MACHINE TENDER	609.685-018		75							75	80	06.04.02
257	TUBE DRAWER	614.685-022					75	70			75		06.04.02
233	MACHINE OPERATOR II	619.685-062								90	85	95	06.04.02
429	REWINDER OPERATOR	640.685-058					70	90				80	06.04.04
306	CARTON-FORMING-MACHINE OPERATOR	641.685-022					80	70				70	06.04.04
137	BAG-MACHINE OPERATOR	649.685-014					80	70				75	06.04.04
034R	BINDERY WORKER	653.685-010					70		80	95	75		06.04.04
146	PRESSER, MACHINE	363.682-018								80	70	80	06.04.05
409	PRESSER, MACHINE	363.682-018						80	95			85	06.04.05
459	V-BELT COVERER	690.685-450						80		90	90		06.04.05
295	BALLING-MACHINE OPERATOR	681.685-014						80		85		80	06.04.06
452	TWISTER TENDER	681.685-130						105	95	85			06.04.06
360	YARN WINDER	681.685-154								80	70	95	06.04.06
427	SPOOLER OPERATOR, AUTOMATIC	681.686-018	X				65	65	85				06.04.06
053	SPINNER, FRAME	682.685-010						70		80	75	85	06.04.06
216	BRAIDING-MACHINE OPERATOR	683.685-010								70	75	80	06.04.06
336	KNITTING-MACHINE OPERATOR	685.665-014	X	75			75				90		06.04.06
365	SAND-SLINGER OPERATOR	518.683-010						90		85		100	06.04.08
308	PAIRING-MACHINE OPERATOR	691.685-022						80		85		80	06.04.09
356	SECOND HELPER	512.684-010						95		80		90	06.04.10
166	DIE-CASTING-MACHINE OPERATOR II	514.685-018					80	75			75		06.04.10
228R75	INJECTION-MOLDING-MACHINE TENDER	556.685-038						75	85	85		85	06.04.10
469R78	CHEMICAL OPERATOR II	558.585-014					75		90	95			06.04.11

Cluster D -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
218	COMPRESSION-MOLDING MACHINE TENDER	556.685-022								75	85	85	06.04.13
017R	PRESS TENDER	556.685-066						80				85	06.04.13
046	RECORD-PRESS TENDER	556.685-070						90				100	06.04.13
067	STEMMER, MACHINE	521.685-334								80	70	70	06.04.15
092	CANNERY WORKER	529.686-014									75	75	06.04.15
121	CANNERY WORKER	529.686-014								75	75	75	06.04.15
122	CANNERY WORKER	529.686-014								85	75	80	06.04.15
041	BOARDING-MACHINE OPERATOR	589.685-010								75	70	85	06.04.16
168	YARN-TEXTURING-MACHINE OPERATOR	589.685-102						80		95		90	06.04.16
112	KILN PLACER	573.686-026						70			70	80	06.04.17
027	LIGHT-BULB ASSEMBLER	692.685-118								75	85	80	06.04.20
161	MOUNTER, AUTOMATIC	976.685-022	X	75				70			75	80	06.04.20
194	ASSEMBLER, METAL FURNITURE	709.684-014								80	80	90	06.04.22
187	VENETIAN-BLIND ASSEMBLER	739.684-166								85	85	85	06.04.22
101R77	ASSEMBLER, AUTOMOBILE	806.684-010							90		80	90	06.04.22
136	ASSEMBLER, SMALL PARTS	706.684-022								80	85	80	06.04.23
141	BENCH ASSEMBLER	706.684-042	X	100			85	85				80	06.04.23
149	CASER	715.684-054								95	85	90	06.04.23
149	HANDS ASSEMBLER	715.684-110								95	85	90	06.04.23
151	MECHANISM ASSEMBLER	715.684-142	X				85	90			90		06.04.23
152	STAKER	715.684-182					85	90		80		75	06.04.23
021	ELECTRIC-MOTOR ASSEMBLER	721.684-022								90	80	80	06.04.23

Cluster D -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002 G	V	N	S	P	Q	K	F	M	GOE CODE
169	COIL WINDER	724.684-026					80		90		80		06.04.23
220	COIL WINDER	724.684-026						80	90		85	85	06.04.23
227	COIL WINDER	724.684-026	X	85						100	110		06.04.23
244	PLUG WIRER	726.687-014								90	85	100	06.04.23
066	ASSEMBLER, DRY CELL AND BATTERY	727.687-022								80	80	80	06.04.23
414R77	ASSEMBLER, ELECTRICAL ACCESSORIES I	729.687-010							80		95	85	06.04.23
290	FINISHER, HAND	731.587-010							85	85		85	06.04.23
134	TOY ASSEMBLER	731.687-034								80	90	100	06.04.23
290	TOY ASSEMBLER	731.687-034							85	85		85	06.04.23
079R	FISHING-ROD ASSEMBLER	732.684-066									80	85	06.04.23
052	FIREWORKS ASSEMBLER	737.587-014									95	95	06.04.23
456	ASSEMBLER, SMALL PRODUCTS	739.687-030							85	85	75	90	06.04.23
246	FINISHER, HAND	754.684-030						90			80	95	06.04.24
362	CHIPPER II	809.684-026						105				95	06.04.24
174	CASE FINISHER	739.684-034					80			90	90	95	06.04.27
346	HAND SEWER, SHOES	788.684-054					80				75	90	06.04.27
112	PASTER	773.684-014						70			70	80	06.04.30
142	SOLDERER, PRODUCTION LINE	813.684-022						90			85	85	06.04.31
447	WELDER, PRODUCTION LINE	819.684-010						70				75	06.04.31
089	MACHINE FEEDER	819.686-010								80	85	75	06.04.31
365	FOUNDRY WORKER, GENERAL	519.687-022						90		85		100	06.04.32
151	OILER	715.684-146	X				85	90			90		06.04.33
094	GLUER	795.687-014						75			80	70	06.04.34

Cluster D -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
138	SILK FINISHER	363.681-010							80	80	75	90	06.04.35
138	PRESSER, HAND	363.684-018							80	80	75	90	06.04.35
260	FLATWORK FINISHER	363.686-010								80		80	06.04.35
219	MARKER II	920.687-126	X	75			75			85	90		06.04.37
376	MAILING-MACHINE OPERATOR	208.462-010						90		95		90	06.04.38
026	POULTRY-DRESSING WORKER	525.687-082									80	80	06.04.38
050	CARDING-MACHINE OPERATOR	681.685-030								90		85	06.04.38
359	ASSEMBLER, HOSPITAL SUPPLIES	712.687-010								85	90	115	06.04.38
016	PACKAGER, HAND	920.587-018								90	85	90	06.04.38
028	PACKAGER, HAND	920.587-018								95	90	90	06.04.38
095	PACKAGER, HAND	920.587-018									85	80	06.04.38
165	PACKAGER, HAND	920.587-018	X			70			85		70	85	06.04.38
193	PACKAGER, HAND	920.587-018								80	80	85	06.04.38
258	PACKAGER, HAND	920.587-018						75		85		75	06.04.38
361	PACKAGER, HAND	920.587-018	X	80	85	85			80				06.04.38
099	PACKAGER, MACHINE	920.685-078						75			90	80	06.04.38
242	PACKAGER, MACHINE	920.685-078								90	75	75	06.04.38
301	PACKAGER, MACHINE	920.685-078	X	80							80	90	06.04.38
341	PACKAGER, MACHINE	920.685-078	X	80				80			80		06.04.38
359	PACKAGER, MACHINE	920.685-078								85	90	115	06.04.38
372	PACKAGER, MACHINE	920.685-078							85		90	90	06.04.38
434	PACKAGER, MACHINE	920.685-078					85				70	95	06.04.38

Cluster D -- cont.

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
296	BAKERY WORKER	929.686-010	X	80				80		100			06.04.38
362	METAL CLEANER, IMMERSION	503.685-030						105				95	06.04.39
083	SCRAPPER	794.687-050						95				85	06.04.39
247	LABORER, GENERAL	509.686-010	X	65			75					75	06.04.40
265	LABORER, SHELLFISH PROCESSING	529.686-058								85		85	06.04.40
131R74	INDUSTRIAL-TRUCK OPERATOR	921.683-050					70			80			06.04.40
351	HARVEST WORKER, FRUIT	403.687-018						75		70		70	03.04.01
416	FARMWORKER, DAIRY	410.684-010					75			70		75	03.04.01
116	SORTER, AGRICULTURAL PRODUCE	529.687-186						70			70	70	03.04.01
294	SORTER, AGRICULTURAL PRODUCE	529.687-186						85		85	95		03.04.01
302	SORTER, AGRICULTURAL PRODUCE	529.687-186								75	70	70	03.04.01
374	SORTER, AGRICULTURAL PRODUCE	529.687-186								95		95	03.04.01
116	PACKER, AGRICULTURAL PRODUCE	920.687-134						70			70	70	03.04.01
070	ARTIFICIAL INSEMINATOR	418.384-010	X	90								80	03.04.05
328	ROTARY-DRILLER HELPER	930.684-026					85	95				85	05.12.02
084	MATERIAL HANDLER	929.687-030						95				85	05.12.03
260	MATERIAL HANDLER	929.687-030								80		80	05.12.03
364	MATERIAL HANDLER	929.687-030						95			75	85	05.12.03
454	MATERIAL HANDLER	929.687-030									65	80	05.12.03
466	MATERIAL HANDLER	929.687-030						85	95			70	05.12.03
274	FOOD-SERVICE WORKER, HOSPITAL	355.677-010							70		70	85	09.05.02
436	FOOD-SERVICE WORKER, HOSPITAL	355.677-010	X	70				75				70	09.05.02

Cluster E: Researching, planning, and maintaining societal systems

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
114	AUDITOR	160.162-014	X	105		115							11.06.01
114	ACCOUNTANT	160.167-010	X	105		115							11.06.01
014	UNDERWRITER	169.167-058	X	120		115			105				11.06.03
175	CASEWORKER	195.107-010	X	105	105	105							10.01.02
158	MANAGER, INDUSTRIAL ORGANIZATION	189.117-022	X	95	100		100						11.05.01
055	DIETITIAN, CHIEF	077.117-010	X	105	105	110							11.05.02
023	MANAGER, CIRCULATION	163.167-014	X	95		110			100				11.05.04
254	SOCIOLOGIST	054.067-014	X	115	110								11.03.02

Cluster F: Persuading, informing, and helping individuals

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
271R	NURSE, GENERAL DUTY	075.374-010	X	100		95			100	95			10.02.01
270R75	NURSE, LICENSED PRACTICAL	079.374.014			75				80	90		85	10.02.01
352R	OCCUPATIONAL THERAPIST	076.121-010	X		110						95	95	10.02.02
347	PHYSICAL THERAPIST	076.121-014	X	105	105		90						10.02.02
272R	OCCUPATIONAL THERAPY ASSISTANT	076.364-010	X		95			75	95			80	10.02.02
054	DENTAL HYGIENIST	078.361-010	X	110			95	110					10.02.02
080	RADIOLOGIC TECHNOLOGIST	078.362-026	X	95	95		80						10.02.02
326R	RESPIRATORY THERAPIST	079.361-010	X		100		85		90				10.02.02
210A	SALES REPRESENTATIVE, CONSTRUCTION MACHINERY	274.357-022	X	100	95		105						08.01.01
204	DIRECTOR, FOOD SERVICES	187.167-026	X	80	80				80				11.11.04
093	DIRECTOR, FUNERAL	187.167-030	X	100	95	105							11.11.04
048	MANAGER, BARBER OR BEAUTY SHOP	187.167-058	X	75				80	95	95			11.11.04
298	MANAGER, AUTOMOBILE SERVICE STATION	185.167-014	X	95		85			85				11.11.05
225	MANAGER, RETAIL STORE	185.167-04 ›	X	105				95	100				11.11.05
186	CLAIM ADJUSTER	241.217-010	X	95	100	95			105				11.12.01
299	LIBRARIAN	100.127-014	X	110		100			110	100			11.02.04

Cluster G: Serving and caring for individuals

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
209	COUNSELOR, CAMP	159.124-010	X	100	95				105				09.01.01
433	AIRPLANE-FLIGHT ATTENDANT	352.367-010	X	100	90	85			100				09.01.04
237	MEDICAL ASSISTANT	079.367-010	X	85	105	80			95				10.03.02
202	DENTAL ASSISTANT	079.371-010	X	90			90		95		90		10.03.02
231	SURGICAL TECHNICIAN	079.374-022	X	85			80					90	10.03.02
287	PSYCHIATRIC AIDE	355.377-014	X	85	75				80				10.03.02
282R75	NURSE AIDE	355.674-014		80				70	80				10.03.02
047	NURSERY SCHOOL ATTENDANT	359.677-018	X	100	105								10.03.03
120	FIRE FIGHTER	373.364-010	X	90			90	95				90	04.02.04

Cluster H: Maintaining bureaucratic rules, records, and transactions

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
188	INSPECTOR, MOTOR VEHICLES	168.267-058	X	75	75	80			80				11.10.03
263	FISH AND GAME WARDEN	379.167-010	X		90		85		85	70			04.01.02
329R74	ADMINISTRATIVE CLERK	219.362-010		90		95			110				07.01.02
032	COURT CLERK	243.362-010	X			80			105	100			07.01.02
398R74	TEACHER AIDE II	249.367-074			80	80			100	105			07.01.02
199	AUDIT CLERK	210.382-010							105	100	80		07.02.01
184	BOOKKEEPER I	210.382-014	X	105	90	95							07.02.01
005	BOOKKEEPING-MACHINE OPERATOR I	210.382-022	X			95		100	110		90		07.02.01
090	CALCULATING-MACHINE OPERATOR	216.482-022	X			95		100	105	95			07.02.02
259R75	TELLER	211.362-018				85		105	110				07.03.01
145R76	CASHIER-CHECKER	211.462-014				85				90		95	07.03.01
200	TICKET AGENT	238.367-026	X	95	105	90							07.03.01
276R77	SALESPERSON, GENERAL MERCHANDISE	279.357-054					75		90	80			08.02.03
249	SALES AGENT, REAL ESTATE	250.357-018	X	110	100	95			90				08.02.04
195	DRIVER, SALES ROUTE	292.353-010	X	85		105			80				08.02.07
196	DRIVER, SALES ROUTE	292.353-010	X	95		110			85				08.02.07
064	MATERIAL EXPEDITER	221.367-042	X	75		70			80				05.09.02

Cluster I: Processing information

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
105	EMPLOYMENT CLERK	205.362-014	X	85	100	90			95				07.04.01
393	HOSPITAL-ADMITTING CLERK	205.362-018	X	95	90				90				07.04.01
006	SURVEY WORKER	205.367-054	X	105	110	95			95				07.04.01
332	HOTEL CLERK	238.362-010	X	95		100			100				07.04.03
009R	CENTRAL-OFFICE OPERATOR	235.462-010			80				90	85		90	07.04.06
251	DISPATCHER, MOTOR VEHICLE	249.167-014	X	115	100	100							07.05.01
379	TRANSPORTATION AGENT	912.367-014	X			85			85			80	07.05.01
108	PROOFREADER	209.387-030		85	100			95	100				07.05.02
010	STENOGRAPHER	202.362-014	X	95				100	100	100			07.05.03
239R74	WARD CLERK	245.362-014		75		75			95	85			07.05.03
162	MAIL HANDLER	209.687-014	X	90					85	85			07.05.04

Cluster J: Manipulating records

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
286	COMPUTER OPERATOR	213.362-010	X	110	95	100							07.06.01
042	TABULATING-MACHINE OPERATOR	213.682-010	X	95		95	85		100				07.06.01
010	CLERK-TYPIST	203.362-010	X	95				100	100	100			07.06.02
180R74	KEYPUNCH OPERATOR	203.582-030		75					110			75	07.06.02
010	TYPIST	203.582-066	X	95				100	100	100			07.06.02
217R75	PROOF-MACHINE OPERATOR	217.382-010				70			115	95			07.06.02
309R77	PROOF-MACHINE OPERATOR	217.382-010				90			100			85	07.06.02

Cluster K: Performing

Sub-cluster K-1: Verbal arts

none

Sub-cluster K-2: Spatial orientation

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
088	CLOTHES DESIGNER	142.061-018	X	100			100	100		95			01.02.03

Occupations for which OAPs not available

SATB #	OCCUPATIONAL TITLE	DOT CODE	R	MINIMUM APTITUDE SCORES, B-1002									GOE CODE
				G	V	N	S	P	Q	K	F	M	
438	FORESTER AIDE	452.364-010	X		90	95				90		90	03.02.02
312R	SUBSTATION OPERATOR	952.362-026	X			80			90			70	05.06.01
312R	SWITCHBOARD OPERATOR	952.362-034	X			80			90			70	05.06.01
312R	TURBINE OPERATOR	952.362-042	X			80			90			70	05.06.01
446	ENGINEER	197.130-010	X	95					100		85		05.06.02
340R	STATIONARY ENGINEER	950.382-026	X			85	85			85	75		05.06.02
357R	STATIONARY ENGINEER	950.382-026				80	90		75	80			05.06.02
342R	WATER-TREATMENT-PLANT OPERATOR	954.382-014	X	90		85			80				05.06.04
179	WAITER/WAITRESS, INFORMAL	311.477-030	X			85						85	09.04.01
164	COUNTER ATTENDANT, LUNCHROOM OR COFFEE SHOP	311.477-014						85		75	75	75	09.04.01
311	FOUNTAIN SERVER	319.474-010						75			85	85	09.04.01
278	SALES CLERK	290.477-014	X		85	80				85			09.04.02
037R	PHARMACIST	074.161-010	X	110		120			115				02.04.01
348R	CORRECTION OFFICER	372.667-018	X		95	95		85	100				04.02.01
437	PARKING ENFORCEMENT OFFICER	375.587-010	X	75	80				105				04.02.02
325	CHEMICAL-ENGINEERING TECHNICIAN	008.261-010	X	115	105			105					05.01.08
378	CHEMICAL-ENGINEERING TECHNICIAN	008.261-010	X		95	105	95						05.01.08
391	RADIOGRAPHER	199.361-010						85	95		80		05.03.05
040R	WEB-PRESS OPERATOR	651.362-030				85	85	85					05.03.13
292	LINEN-SUPPLY LOAD-BUILDER	920.687-118							90			80	05.09.01
182	LABORER, STORES	922.687-058							95	80	85		05.09.01

Occupations for which OAPs not available --- cont.

353	SUPERVISOR, ELECTRONICS	726 130-010	X	105	90							100	06 01.01
450	PROGRAMER, DETAIL	219 367-026	X			95	85			85			11.01.01
320	CREDIT ANALYST	191 267-014	X		90				110	100			11.06 03
420	MANAGER, DEPARTMENT	299 137-010	X			80		85	90				11.11.05